INTEGRATED TRANSFORMATIONS OF E-HEALTH: PERSPECTIVES OF STAKEHOLDERS

MYKOLAS ROMERIS
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ACRONYMS

Data Protection Directive – **Directive 95/46/EC of the European Parliament and the Council on the protection of individuals concerning the processing of personal data and the free movement of such data.**

Draft Data Protection Regulation – Proposal for a Regulation of the European Parliament and the Council on the protection of individuals with regards to the processing of personal data and free movement of such data.

SPD – Single Programming Document
CR – set of roles required for cooperation
EC – European Commission
ERDF – European Regional Development Fund
EU – European Union
EHR – electronic health record
e-health – electronic health
ESPBI IS – Electronic Health Services and Cooperation Infrastructure Information System
EMR (EMI) – electronic medical record
HIS – Hospital Information System
ICT – information and communication technologies
IS – information systems
IT – information technologies
Stakeholder involvement model – a model that promotes stakeholder involvement and participation
CI – collective intelligence
MedVAIS – sub-system for the archive of medical images (x-rays, etc.)
IoC – intelligence of crowds
Directive on Patients' Rights – Directive 2011/24/EU of the European Parliament and of the Council of 9 March 2011 on the application of patients' rights in cross-border healthcare
PET – privacy enhancing technologies
NESS – National e-Health Information System
PSC – eHealth Platform for Stakeholder Cooperation

Nursing IS – electronic service for nursing at home and palliative care
HI – healthcare institution
SPMSPK – Clinic for Nursing, Palliative Medicine and Social Services (the Clinic)
OHOR – “one resident – one history”
VAIISIS – Information System for Interoperability of Public Administration Information Systems
VIISP – State Information Resources Interoperability Platform
MM – measures of collective intelligence management
MP – knowledge management process

ABSTRACT

E-health is perceived as the most imperative innovation in health system management. Therefore, just as any other innovation it should expect all inherent challenges – technical problems as well as a wide range of human factor issues. Research suggests that in the healthcare sector, resistance to innovations is "a significant, powerful and influential phenomenon, which forces people to oppose to novelties immediately, even before discussions start on the pros and cons of an innovation".[1]

The **aim** of the integrated research presented in the monograph – striving for innovative and sustainable healthcare system, to assess the extent of e-health development and trends from the network perspective of stakeholders as the most important success factor in the e-health deployment. **Objectives** are as follow:

1. Analyse and summarise examples of international good practice related to stakeholder engagement as one of the key success factors in e-health deployment;
2. Identify and characterise stakeholders of the national e-health system (with the help of social network analysis);
3. Investigate the scope and trends particular to engagement and participation of e-health developers, installers and users (stakeholders);
4. Design an integrated e-health deployment platform that promotes engagement and participation within the network of stakeholders;
5. Test the platform for integrated e-health network and identify functional barriers and risk;
6. Aiming for innovation and sustainability, design political, organisational and managerial measures for the implementation of the platform for integrated e-health network.

Methods. In this research, the stakeholder perspective is highlighted on the basis of the innovative social network theory and principles of systems thinking (general systems theory). The research combines compara-

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[1] Jasulaitis, A.; Plenta, J.; Justickis, V.; Plentienė, J. 2012. Sveikatos apsaugos įstaigos darbuotojų pasipriešinimo inovacijoms motyvai. *Sveikatos politika ir valdymas*, 1(4), p. 272–295.

tive analysis, quantitative and qualitative social research methods, social network analysis and experimental study.

Results. According to international experience, there are two main approaches emerging in countries with more developed e-health systems: the Welsh approach (for instance, Denmark, the Netherlands, Finland and New Zealand) and the traditional English approach. In terms of e-health, the EU still lacks legal regulation between member states. Compared to the analysis made by the Ministry of Health of the Republic of Lithuania in 2011, the national e-health development is showing a positive trend. While, in 2011, only a quarter of all surveyed institution had e-health systems, our study demonstrated that at present, 67 per cent of professionals working at healthcare institution use e-health information systems on a daily basis. Also, e-health stakeholders were identified: healthcare professionals (physicians, nurses, IT specialists, laboratory and other specialists), patients, health and IT policy makers and implementing entities, employees of IT companies. The role of a central node in a social network (the highest degree of centricity and cooperation) is usually undertaken by hospitals and outpatient clinics that implement projects as they become the owners of e-health products and have the best method to collect information about relevant e-health needs. For the time being, patients are almost completely ignored in the process of e-health development and deployment. Their role is mostly theoretical, based on knowing that they seem to be important for product development; however, no real efforts are made to make this practice operational. In the current period, the following e-health services are mostly developed in Lithuania: online patient appointment reservation, completion of medical statements, online tracking of patient insurance and enrolment, online filling of the statistical form of outpatient accounting (currently, 025/a-LK-form). Significant inequalities exist in the overall development of e-health services as well as their accessibility and use among medical professionals and residents. E-health services are most accessible in Vilnius and other large cities and the least – in villages and small private healthcare institutions. Only a limited, number of healthcare professionals believe that Lithuania has a sufficient range of e-health information systems. Usually, managers, specialists and residents mention three services that are still missing: e-prescriptions, electronic health record and online patient appointment reservation. Awareness of e-health services among residents is poor. Among the main reasons why users are insufficiently informed, tend to underuse e-health systems and feel dissatisfied with the e-health deployment process is the availability of e-health system and stakeholder engagement in the decision-making and the development of e-health services aiming to ensure their acceptability to users. Although medical professionals perceive innovations in a more positive light, there is still a greater portion of the group that have a negative opinion regarding the actual process of e-health deployment and its extent. Along with problems related to financing (only one-third of surveyed institutions received EU Structural Funds), shortage of human resources (especially in small and rural healthcare institutions) and regulatory problems, issues related to deployment of innovations in management of processes became apparent, e.g. employee resistance to change, when certain groups of workers (especially, the elderly) avoid using new systems. The Ministry of Health has too many functions in the field of e-health while too few of them are entrusted to healthcare institutions. This can be partly explained by the novelty of the e-health and evaluation of errors made during the first stage of the system's development when processes of e-health development lacked leadership and coordination of the Ministry. However, currently, there is a lack of bolder leadership among healthcare institutions in assuming functions of decision-makers.

The design of the model promoting stakeholder engagement and participation commenced with a description of necessary managerial conditions and links between them, which determine support to stakeholder engagement and participation in the development of best e-health system solutions. The e-Health Platform for Stakeholder Cooperation was developed on the basis of the hierarchy of innovations in the health system and healthcare management (people-centred, enabling strategies for health promotion, integrated healthcare and teamwork) and the interplay of management theories. In the theoretical model, knowledge management describes aims of the developed platform (to accumulate and analyse knowledge); management of collective intelligence defines the purpose of the e-Health Platform for Cooperation (to create interaction between stakeholders aimed at new quality of collective knowledge); management of stakeholders determines users of the e-Health Platform (who are e-health stakeholders and how to recognise them); the group role theory helps to recognise the mechanics behind stakeholder cooperation and related barriers. Structurally, the model is based on five elements: participants, a set of roles required for cooperation (CR), measures for collective intelligence management (MM), knowledge management process (KMP), and their interaction. The model mentioned above unveils a tri-fold nature of participation. Effectiveness of the knowledge management process and interaction E(KMP+I) is a dynamic function that depends on measures of collective intelligence management (MM), completeness of stakeholder set, role manifestation quality (CR) and effectiveness of interaction: $E(KMP+I) = f(MM, CR, I)$.

The model of the e-Health Platform for Stakeholder Cooperation (PSC) is based on the lifecycle of ideas, in which the main object under management is a primary idea, which survives all knowledge management cycles from accumulation to gestation of ideas. **Despite the rather complex theoretical model, the platform available in the electronic space is very simple and user-friendly (http://ehealth.lt).** The e-Health Platform for Cooperation ensures the following benefits for the e-health system: learning, knowledge sharing through participation, trust-based development of networks, promotion and design of the knowledge process, and generation and accumulation of ideas. Testing of the e-Health Platform for Stakeholder Cooperation revealed an apparent need for the Platform. During the pilot, stakeholders not only demonstrated being in possession of knowledge and information regarding the development of the e-health system and related issues but also unveiled the need to update information. The pilot showed satisfaction of participants that resulted from the facilitation of engagement and discussions. Voting for alternative proposals also reflected the need for engagement and greater participation, which can be interpreted as motivation to development the e-health system.

Applying the designed model in the continuous process through health management innovations and possibilities offered by social technologies, and effecting the interplay of management theories, problems generated in the e-Health Platform for Stakeholder Cooperation and suggested solutions produce a dynamic set of political, organisational and managerial measures that are constant and self-updating in current time, which is valuable

for decision-making in e-health development. Consequently, the designed Platform automatically provides and updates political, organisational and managerial measures in real time.

ACKNOWLEDGEMENTS

Authors of the monograph would like to express sincere gratitude to employees of the E-health Coordination and Implementation Division of the Ministry of Health for invaluable consultations; to managers and staff of healthcare institution and IT companies for time given to surveys and platform testing, and sharing of insights related to the development of the e-health system.

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INTRODUCTION

According to the research project *Integrated transformations of e-health: perspectives of stakeholders*, “new technologies transform our daily socio-economic life making a considerable impact on its quality. In the meantime, healthcare is becoming increasingly more dependent on information and communications technologies that enable the development of high-quality healthcare services. The Programme for the Development of eHealth System of the Republic of Lithuania for 2009–2015 was designed aiming to balance the existing and newly emerging ICT implementation possibilities, national and global trends as well as long-terms and short-term healthcare needs in a way that enables an evolutionary development of the Lithuanian e-health system and consistent improvement of the quality of healthcare services”.[2]

The practical relevance of the investigated problem has been highlighted by applicable EC documents and certain processes observed in the EU Member States. “Already in April 2004, the European Commission adopted the e-Health Action Plan and instructed the EU Member States to design national e-health roadmaps and action plans to facilitate the effective implementation. Soon enough, a wide range of e-health infrastructure information systems became one of the key elements in strategic documents of the health sector and deployment of information and communication technologies in the healthcare sector became associated with provision of safe, effective, high-quality and patient-centred healthcare services. However, despite the ambitious plans and associated expectations, this process was frequently faced with disappointment arising from the failure of complex ICT projects. Most EU Member States encounter challenges on the national level of e-health development, and rare good practice is insufficiently analysed. In this context, Lithuania is no exception: according to reports of the National Audit Office of Lithuania (2008, 2011), the Lithuanian e-health system, the development of which commenced in 2006, is still inoperable.

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[2] An ongoing project of Mykolas Romeris University “Integrated transformations of e-Health development: stakeholder network perspective” (project code No. VP1–3.1-ŠMM-07-K-02-029), financed by EU funds.

Similar conclusions were made by authorities in charge of public finance in other countries (e. g. France and England); meanwhile, effective models (e. g. Welsh, Dutch and Danish) remain insufficiently analysed".[3] Consequently, it seems highly valuable to investigate this process in the current perspective.

In this monograph, the theoretical relevance of the problem is first of all related to the growing number of scientific studies focused on the analysis of deployment of information systems in the organisational context (Orlikowski and Baroudi, 1991; Neumann et al., 1996; Scholl, 2004; Aubert, 2008 etc.). On the one hand, it is underlined that ICT deployment has an immense potential for improving the operation of healthcare institutions (Neumann et al., 1996; Scholl, 2004, etc.). Yet, at the same time authors recognise that expected benefits may only be achieved provided the information systems were appropriately designed and installed (Heeks et al., 1999; Scholl, 2004, etc.). In this context "appropriateness" is first of all related to the focus on specifics particular to change management in organisations (including stakeholder engagement perspective), the importance of which in the healthcare sector is believed to be greater than in other sectors (Cho et. al., 2007; Butler and Murphy, 2007).

The role of stakeholders in the organisational context of technologic change management has been widely investigated in various research outputs (e. g. Hirschheim and Klein, 1989; Bravo, 1993; Lyytinen and Robey, 1999; Gallivan and Keil, 2003; Scholl, 2004; Chang, 2006 etc.). In Lithuania, some researchers have already focused on good practice and effective e-health development processes (Juciūtė, 2009; Rotomskienė, 2011, 2012, Štaras, 2013). The need for a new study was driven by the fact that so far, research results mostly focused on technical and economic aspects and, consequently, failed to provide answers to all questions related to ICT deployment in organisational contexts (in healthcare sector in particular). Projects of the kind are still associated with high implementation risk (Scholl, 2004) and often lead to ineffective use of investments and failure to successfully reorganise work processes (Mustonen-Ollila and Lyytinen, 2003). The current scientific literature underlines the need for new studies that would draw more attention to models of social processes (Min-

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[3] *Ibid.*

gers, 2001, 2003, 2004; Mustonen-Ollila and Lyytinen, 2003; Doolin, 2004; Boudreau, 2005; Choudrie, J. and Dwivedi, Y.K., 2005 etc.).

Guidelines for the development of the e-health system are centred on the population, health maintenance and strengthening, early diagnostics and timely treatment providing direct and indirect (through healthcare professionals participating in healthcare activities) services. Deployment of new technologies increases the effectiveness of work in a healthcare institution and transforms the nature of its work as well as facilitates the movement of electronic health information among organisations based on national standards.

This scientific monograph is based on the **idea** that **stakeholder engagement in e-health development processes may promote a more effective deployment of innovations in the healthcare field as well as greater sustainability of achieved changes**, which is critically important for the development of innovative health policy. Stakeholder engagement in the national e-health development process has a potential for a multi-levelled effect aimed at innovation and sustainability of changes. In essence, patient-centred healthcare requires new modes of work organisation and service provision. Methods and measures used to engage stakeholders in the national e-health development process are of utmost importance as they determine the effectiveness of engagement utility. The idea was driven by good practice collected abroad and in Lithuania as well as emerging scientific evidence.

The **aim** of the integrated research presented in the monograph – striving for innovative and sustainable health care system, to assess the extent of e-health development and trends from the network perspective of stakeholders as the most important success factor in the e-health deployment. **Objectives** are as follow:

1. Analyse and summarise examples of international good practice related to stakeholder engagement as one of the key success factors in e-health deployment;
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engagement and participation within the network of stakeholders;

5. Test the platform for integrated e-health network and identify functional barriers and risk;
6. Aiming for innovation and sustainability, design political, organisational and managerial measures for the implementation of the platform for integrated e-health network.

Research object – "ICT deployment process in the national healthcare sector and the role of stakeholders aiming for cultivation of innovations in organisation of healthcare services, continuous improvement of the quality of services and sustainability of organisational changes related to these processes".[4]

The exceptionality of the scientific research is based on the idea that ICT deployment in the healthcare sector is rather a socio-organisational than technical process, even though the latter is predominant among policy-makers.

The monograph is comprised of seven chapters. **The chapter one *e-Health and Legal Regulation*** has two main parts: one on legal regulation in the EU, some foreign countries (EU and non-EU) and Lithuania; and the other – legal regulation of an electronic health record, as an example. The legal framework is especially important for the development and spread of e-health systems; therefore, analysis of legal e-health regulation as well as introduction of legal aspects pertaining to a single e-health record (as an independent institute) make a valuable contribution to further empirical studies and results of the monograph. Suggestions offered at the end will be useful for those planning to contribute to the improvement of the nation legal framework for e-health.

Chapter two *European Experience* introduces examples practically developed e-health. The process of implementation and the content of e-health is rather varied among different countries. Countries with most developed e-health systems use the Welsh approach (for instance, Denmark,

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[4] An ongoing project of Mykolas Romeris University "Integrated transformations of e-Health development: stakeholder network perspective" (project code No. VP1–3.1-ŠMM-07-K-02-029), financed by EU funds.

the Netherlands, Finland and New Zealand and Wales), while others are following a more "traditional" pathways called the English approach.

Chapter three *Analysis of eHealth Projects in Lithuania* aims to reveal e-health stakeholders and the environment (the context and reality), in which the projects emerged. Key stakeholders become apparent through introduction of aims and objectives as well as summarising key target groups of e-health projects; presentation of promoters, partners and other stakeholders, primary sources of funding, names if IT companies that won public procurement tenders for project implementation; analysis of project status and implementation timescales. In addition, this chapter also presents a practical example entitled *Case study: Experience of the Central Polyclinic of Vilnius in engagement of stakeholders in the development and installation of the electronic service for nursing at home and palliative care*, which describes a particular e-health development case in Lithuania, IS development and deployment in healthcare institutions. In addition, it demonstrates the extent of required complex organisational measures, human resources, IT of an institution, and dissemination of appropriate information during the IS development and deployment. The specific example confirms the importance of stakeholder engagement and difficulty in achieving it.

Chapter four *e-Health System in Lithuania from the Perspective of Users* introduces results of three quantitative studies that defined the scope and trends pertaining to the involvement of stakeholders in the e-health development process in Lithuania. On the basis of analysis of quantitative sociological studies on e-health designers, implementers and users, assessment was made on the level of awareness among staff and managers of healthcare institutions and the general population in relation to e-health information technologies, use of technologies, e-health technology assessment in Lithuania and respective healthcare organization; in addition, specificity and challenges related to deployment of e-health technologies were revealed.

Chapter five *Qualitative Analysis: Roles of e-Health Participants and Problems* presents outcomes of a more detailed empirical study that investigated the development of health information digitalisation and electronic exchange, causes of ineffective development as well as the key obstacles impeding on the development of the e-health system. The chapter investigates how stakeholders perceive their roles as well as roles of other participants of the e-health system. The analysis is organised around roles of five stakeholders: the Ministry of Health, managers of health care institutions, external IT companies, specialists of healthcare institutions and medical staff, and patients.

Chapter six ***Stakeholder Roles in e-Health Projects: Social Network Analysis*** focuses on data of yet another original qualitative study. The social network analysis aimed to investigate stakeholders already engaged in the designed and implementation of the Lithuanian e-health system as well as to learn better about their role in the entire e-health development chain. The social network analysis facilitates the reconstruction of role sharing among stakeholders in the network and understanding of various engagement techniques.

Chapter seven is entitled ***e-Health Platform for Stakeholder Cooperation***. Previous studies determined that challenges related to the development of e-health systems may be addressed with the help of measures that strengthen stakeholder engagement, such as the eHealth Platform for Stakeholder Cooperation, which would be intended for the development of interaction between e-health stakeholders and facilitate the resolution of e-health problems in real time. Aiming to develop such platform, we described the place of e-health in the context of prevailing health innovations and offered the most advanced technologies that could be used for the platform. In addition, the predominant management paradigms were overviewed that could provide the basis for elements of the platform that would ensure improved engagement in e-health development. Furthermore, the significance of stakeholder roles was defined, on the basis of which the model for engagement and participation model was designed and tested. The structure of the eHealth Platform for Stakeholder Cooperation rests on this model. This electronic platform for the promotion of engagement and cooperation is based on scientific evidence and social technologies. Moreover, it is the key innovation utilised by political organisations and listed among progressive management tools.

We are thankful to reviewers of the monograph prof. dr Tadas Sudnickas, prof. dr. habil. Vilius Grabauskas and prof. dr. Arūnas Andziulis for efforts and comments that helped us improve and publish the monograph, which presents findings and observations of authors and yet is relevant and accessible to professionals, researchers and students interested in e-health.

1. eHEALTH AND LEGAL REGULATION

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1.1. Legal regulations on e-health in the EU

As stated in the Communication *eHealth Action Plan 2012–2020 – Innovative healthcare for the 21st century*[5], removal of legal barriers is critical for eHealth development in Europe. The measures, taken by the EU itself in order to coordinate eHealth legal regulation in the EU Member States, are therefore necessary. Regulation of the field of eHealth in the individual EU Member States is also significant. To compare, it is important to analyse certain non-EU countries and their current e-health legal environment. Legal regulation of e-health in Lithuania should also be examined in the context of this analysis.

Objectives of the research

1. To analyse the legal regulation of e-health in the EU.
2. To analyse the legal regulation of e-health in the certain EU Member States and in certain non-EU countries.
3. To analyse the legal regulation of e-health in Lithuania.

Methods

The following research methods were used to complete the objectives of the research: comparison, document analysis, deduction. The examination of the e-health legislation in the EU, individual foreign countries and Lithuania was completed by using the method of comparison (rules of law relating to the general legal regulation of e-health, the institution of consent to process personal data on health, etc. were compared). To determine legal

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[5] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. EHealth Action Plan 2012-2020-Innovative healthcare for the 21st century. COM/2012/0736 final. Brussels, 2012 [accessed 02-12-2014]. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52012DC0736:EN:NOT>; clause 4.3.

regulation of a valid e-health record, the empirical method of legal document analysis was applied. This method allows analysing official documents to identify accurately and describe the valid legal regulation of a respective relationship. The deduction method applied using scientific literature resources allows sufficiently reliable conclusions.

Research results

The study revealed that currently, for the most part, the e-health vision in the field of e-health is yet in the process of formation. Regulation regarding the initiation of certain processes (adoption of guidelines, etc.) has also begun. This should be seen more as the initial steps in e-health to develop a common regional e-health policy. With regard to the binding legislation in the field of e-health, Directive 2011/24/EU on patients' rights only initiates certain processes in e-health (development of guidelines, etc.). However, so far it does not provide any principles of operation of regional e-health systems and does not ensure the practical operation of such system as of the specified date.

Personal data protection in e-health is regulated by the EU through common privacy protection standards. However, the data protection reform has a sufficient importance in this field. The draft regulation mainly focuses on the institution of consent to process health data. However, documents for this reform are yet to be finally adopted. Consideration of the opinion issued by the Article 29 Working Party of the Data Protection Directive is also important for the processing of personal data in healthcare systems.

At present, legal regulation of e-health in the EU Member States is rapidly developing. However, it still contains many differences and lacks a unified policy and strategy. Different models of electronic health records are applied. Regulation of the consent to process personal data for the purposes of e-health differs considerably. In addition, national laws in the countries under investigation do not regulate interoperability of local e-health systems with e-health systems operating in the other EU Member States. In relation to legal liability for abuse or careless processing of information in electronic health records, the general liability is applied in all the countries under investigation, and no special liability is established.

Processes of e-health legal regulation are gaining pace in other non-EU countries as well. It should be noted that, first of all, the legal regulation is introduced starting from the fundamental rules of law and later – by statutory instruments. However, there are many noticeable differences in e-health regulation that emerge from a comparison of these countries among them or with the European Member States (different regulatory instruments, etc.).

Lithuania has a number of valid documents: the eHealth Development Strategy, the Programme for the Development of eHealth System and the Action Plan of the Programme on the Development of eHealth System. However, all these documents provide goals and measures for up to 2015. The fundamental legal regulation on e-health has not yet established relevant provisions regarding the electronic medical record/ electronic health records; whereas, the fundamental legal regulation on patients' rights and compensation for personal injuries does not correspond to today's realities. Personal data protection issues related to eHealth systems are regulated by general rules of law regarding the protection of privacy.

eHealth documents in the EU

As stated in the preamble of the Directive on the application of patients' rights in cross-border healthcare, health systems in the Union are a central component of the Union's high levels of social protection, which is ensured by relevant legal regulation.[6] Therefore, it is important to analyse how the European Union regulates and unifies this field, which is necessary for the society. In addition, as a result of Lithuania's accession to the EU, the European Union legislation has a significant impact on the national law. Thus, it is also important in the context of Lithuania and other foreign countries, to examine which legal documents are adopted at the EU level in the field of e-health.

Although, currently there is no single authority charged with the e-

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[6] Directive 2011/24/EU of the European parliament and of the Council of 9 March 2011 on the application of patients` rights in cross border healthcare. Brussels, 2011 [accessed 04-12-2014]. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:088:0045:0065:en:PDF>, preamble, clause 2-3.

health legislative function in Europe[7], nevertheless, the field of e-health is rather actively regulated in the European Union. It should also be noted that this monograph does not intend to list all former and current legal acts or other e-health documents. It will instead be limited to the analysis of the main legal acts and documents.

First of all, several EU communications should be mentioned. Those are not legally binding documents, yet they specify the EU vision and direction in the domain of e-health.

1.1.1. Communication eHealth – making healthcare better for European citizens: An action plan for a European eHealth Area

In 2004, the European Commission published the EU strategic document related to health matters *eHealth – making healthcare better for European citizens: An action plan for a European eHealth Area*.[8] This Communication states that this is the third largest industry in the European health sector. It also emphasises the need for e-health control and management, interoperability of systems and electronic records, patients' catalogue, development of new technologies and methods, balancing of investments, and creation of legal environment and a common EU e-health space.

More specifically, major challenges for wider implementation e-health systems are as follow:

a) Commitment and leadership of health authorities;
b) Interoperability of e-health systems;
c) User friendliness of e-health systems and services;
d) Lack of regulation and fragmentation of e-health market in Europe;
e) Confidentiality and security issues;
f) Mobility of patients;
g) Establishment of European networks of reference;
h) Needs and interests of users;

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[7] George C., Whitehouse D., Duquenoy P. eHealth: Legal, Ethical and Governance Challenges. Berlin: Springer-Verlag, 2013, p. 7.

[8] Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions. eHealth – making healthcare better for European citizens: An action plan for a European eHealth Area. COM/2004/356 final. Brussels, 2004 [accessed 02-12-2014]. < http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2004:0356:FIN:EN:PDF>.

i) Access for all to e-health;
j) Common understanding and concerted efforts by all stakeholders.

The Communication addresses the legal and regulatory matters on a rather small scale. It is stated that the EU needs to establish a standardised European qualification for e-health services. The Communication also states that certainty of e-health products and service liability within the context of legislation would be beneficial (especially in case of personal injuries). The Communication also states that there is a certain barrier in a form of different national legal regulation systems, which need to be unified.[9]

In regard to confidentiality and security issues, the Communication emphasises the codes of conduct in areas of privacy and personal data protection, which could be used by participants of the e-health system. In other words, mechanisms of self-regulation are stimulated.

1.1.2. eHealth Action Plan 2012–2020 – Innovative healthcare for the 21st century

Another important document is *eHealth Action Plan 2012–2020 – Innovative healthcare for the 21st century*[10] (eHealth Action Plan 2012–2020). This plan specifies that notwithstanding the previously adopted e-health documents, there are still barriers existing in the introduction of an operable e-health system in Europe. Therefore, the new eHealth Action Plan aims at addressing and removing these barriers. This new action plan accentuates and specifies the e-health vision in Europe. It presents and consolidates efforts aimed at providing all the possibilities that e-health can provide, defines the role of the EU in this field, and encourages Member States and relevant stakeholders to work together to achieve the goals set.

Clause 2.3 of the eHealth Action Plan 2012–2020 lists specific barriers for e-health development. One of them is the lack of legal clarity as much

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[9] *Ibid.*, clause 4.2.7.

[10] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. EHealth Action Plan 2012-2020-Innovative healthcare for the 21st century. COM/2012/0736 final. Brussels, 2012 [accessed 02-12-2014]. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52012DC0736:EN:NOT>.

as it is related to mobile health applications and the lack of transparency regarding the use of data collected by such applications.

The entire Clause 4.3 addresses legal issues. It reads that bringing down legal barriers is vital for deploying e-health in Europe. The Directive on the application of patients' rights in cross-border healthcare will contribute to achieving such an objective as it clarifies patients' rights to receive cross-border healthcare.

The European Commission Staff Working Paper on the applicability of the existing EU legal framework for telemedicine services clarifies the EU legislation applicable to issues such as reimbursement, liability, licensing of healthcare professionals and data protection encountered when providing telemedicine across borders.

Two important areas are specified in the eHealth Action Plan 2012–2020, to the extent it is related to legal regulation problems:

a) Review of data protection rules.

Effective data protection is vital for building trust in e-health. It is also a key driver for its successful cross-border deployment.

Data protection issues also need to be addressed with respect to the use of cloud computing as this infrastructure can be used for e-health services.

The draft Data Protection Regulation[11] proposed by the Commission is crucial in this area. Currently, this proposal for a regulation is under consideration and will hopefully be adopted in the nearest future.

b) Lack of clarity on legal and other issues around "mobile health" (mHealth).

It is stated that there is an increase in the number of software applications for mobile devices. Such applications provide excellent opportunities for e-health. They are blurring the distinction between the traditional provision of clinical care by physicians, and the self-administration of care and wellbeing. Network operators, equipment suppliers, software developers and healthcare professionals are all seeking clarity on the roles they could play in the value chain for mobile health.

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[11] Commission proposes a comprehensive reform of the data protection rules. Brussels, 2012 [accessed 02-12-2014]. <http://ec.europa.eu/justice/newsroom/data-protection/news/120125_en.htm>.

It is stated that further clarification is needed on the legal framework applicable to the area of mobile health.

The current structure raise many questions, for instance, the use of the data collected through mobile applications, and whether or not they will be integrated into e-health systems. Quality and transparency of information etc. are also important and should be considered.

It is proposed that the Commission would adopt a Green Paper on mHealth and related applications.

EU Member States should take into account the provisions of these Communications and adjust their national laws to address the problems mentioned in these documents.

1.1.3. Commission Recommendation of 2 July 2008 on cross-border interoperability of electronic health record systems (2008/594/EC)

This legally non-binding Recommendation, which was adopted in 2008 but is still relevant, provides a set of guidelines for developing and deploying interoperable electronic health record systems, allowing for cross-border exchange of patient data within the Community so far as necessary for a legitimate medical or healthcare purpose. Such electronic health record systems should enable healthcare providers to ensure that a patient receives care more effectively and efficiently by having timely and secure access to basic, and possibly vital, health information, if so required, and in conformity with the patient's fundamental rights to privacy and data protection.[12]

The Recommendation provides offers to maintain cross-border interoperability of electronic health record systems and undertake actions at five levels, namely the overall political, the organisational, the technical, the semantic and the level of education and awareness raising.[13] In addition, the importance of certification and ensuring personal data protection is emphasised.

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[12] Commission Recommendation of 2 July 2008 on cross-border interoperability of electronic health record systems (EB/2008/594). Brussels, [accessed 08-12-2014]. <http://eur-lex.europa.eu/legal-content/LT/TXT/HTML/?uri=CELEX:32008H0594&from=EN>, clause 1.

[13] *Ibid.*, clause 4a.

To summarise, the EU Communications shape the vision of e-health. The emphasis is placed on the unification of EU e-health systems and interoperability as well as the importance of legal regulation. However, adoption of these Communications is seen as initial steps in e-health.

Secondly, in addition to legally non-binding documents, the EU has adopted a number of directives that Lithuania should transpose into the national legal system.

1.1.4. Directive 2011/24/EU of the European Parliament and of the Council of 9 March 2011 on the application of patients' rights in cross-border healthcare

Directive 2011/24/EU of the European Parliament and of the Council on the application of patients' rights in cross-border healthcare[14] (the Directive on Patients' Rights) provides rules for facilitating the access to safe and high-quality cross-border healthcare and promotes cooperation on healthcare between Member States, in full respect of national competencies in organising and delivering healthcare. This Directive also aims at clarifying its relationship with the existing framework for the coordination of social security systems and the Regulation (EC) No 883/2004, with a view to the application of patients' rights.[15]

Clause 57 of the Directive's preamble states that the interoperability of e-health solutions should be achieved by the Member States. Although this provision is in the preamble and does not have to be transposed into the national legislation, it indicates the aim to be achieved by the EU in the future.

Article 14 of the Directive on Patients' Rights is dedicated to e-health. Part 1 of this Article states that the Union supports and facilitates cooperation and the exchange of information among the Member States working within a voluntary network that connects national authorities responsible for e-health designated by the Member States.

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[14] Directive 2011/24/EU of the European Parliament and of the Council of 9 March 2011 on the application of patients' rights in cross-border healthcare. Brussels [accessed 04-12-2014]. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:088:0045:0065:en:PDF>.

[15] *Ibid.*, art. 1, p. 1.

According to the Directive on Patients' Rights, the objectives of the e-health network are as follow:

a) *"work towards delivering sustainable economic and social benefits of European eHealth systems and services and interoperable applications, with a view to achieving a high level of trust and security, enhancing continuity of care and ensuring access to safe and high-quality healthcare.*
b) *draw up guidelines on:*
   - a non-exhaustive list of data that are to be included in patients' summaries and that can be shared among health professionals to enable continuity of care and patient safety across borders; and
   - effective methods for enabling the use of medical information for public health and research.
c) *support Member States in developing common identification and authentication measures to facilitate transferability of data in cross-border healthcare".*[16]

The objectives referred to in points (b) and (c), according to the Directive on Patients' Rights, shall be pursued in due observance of the principles of data protection as set out, in particular, in Directives 95/46/EC and 2002/58/EC.

It should be mentioned that, according to Article 4 of the Directive on Patients' Rights, the Member State of treatment shall ensure that <...> "*in order to ensure continuity of care, patients who have received treatment are entitled to a written or electronic medical record of such treatment, and access to at least a copy of this record in conformity with and subject to national measures implementing Union provisions on the protection of personal data, in particular Directives 95/46/EC and 2002/58/EC*".[17] Thus, this Directive also stimulates the use of electronic medical records in treatment services.

It can be stated that this Directive only initiates certain processes in e-health (development of guidelines, etc.). However, so far it does not provide

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[16] *Ibid.*, art. 14, p. 2.

[17] Directive of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data, 95/46/EC. Official Journal, 1995/ L 281, [accessed 08-12-2014]. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31995L0046:en:HTML>, art. 4.

any principles of operation of regional e-health systems and does not ensure the practical operation of such system as of the specified date.

The Directive had to be transposed into national laws of Member States before 25 October 2013. The Directive has been transposed into the national legal system of the Republic of Lithuania within the deadlines established, which was communicated to the European Commission.

1.1.5. Directive 95/46/EC of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data and on the free movement of such data and the European Parliament legislative resolution of 12 March 2014 on the proposal for a regulation of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation)

1.1.5.1. Directive 95/46/EC of the European Parliament and of the Council

The only general binding legal act of the EU in the area of privacy is the **Directive 95/46/EC of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data and on the free movement of such data**[18] (the Directive on Data Protection or the Directive). This Directive applies to the processing of personal data entirely or partly by automatic means, and to the processing otherwise than by automatic means of personal data which form a part of a filing system or are intended to form a part of a filing system. This Directive also applies to the management of health records.

The Directive on Data Protection is twofold. On the one hand, the Directive aims to protect the fundamental rights and freedoms of individuals and, in particular, their right to privacy of personal data. On the other hand, the Directive neither restricts nor prohibits the free movement of personal data between the Member States for reasons relating to the protection of personal data.

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[18] *Ibid.*

The Directive accentuates the following regulation principles:

1) *Data quality.* Personal data must be:
   - "*processed fairly and lawfully;*
   - *collected for specified, explicit and legitimate purposes and further processed in a way compatible with those purposes;*
   - *adequate, relevant and not excessive in relation to the purposes for which they are collected and/or further processed;*
   - *accurate and, where necessary, kept up to date; every reasonable step must be taken to ensure that data which are inaccurate or incomplete, having regard to the purposes for which they were collected or for which they are further processed, are erased or rectified.*
   - *kept in a form which permits identification of data subjects for no longer than is necessary for the purposes for which the data were collected or for which they are further processed*".[19]
2) *Legitimate data processing*. Personal data may be processed only provided:
   - "*the data subject has unambiguously given his consent; or*
   - *processing is necessary for the performance of a contract to which the data subject is a party or in order to take steps at the request of the data subject prior to entering into a contract; or*
   - *processing is necessary for compliance with a legal obligation to which the controller is subject; or*
   - *processing is necessary in order to protect the vital interests of the data subject; or*
   - *processing is necessary for the performance of a task carried out in the public interest or in the exercise of official authority vested in the controller or in a third party to whom the data are disclosed; or*
   - *processing is necessary for the purposes of the legitimate interests pursued by the controller or by the third party or parties to whom the data are disclosed, except where such interests are overridden by the interests for fundamental rights and freedoms of the data subject*".[20]
3) *Special personal data*. There is a prohibition to process personal data "*revealing racial or ethnic origin, political opinions, religious or philo-*

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[19] *Ibid.*, art. 6.

[20] *Ibid.*, art. 7.

sophical beliefs, trade-union membership, and the processing of data concerning health or sex life"[21], with certain exceptions.

4) *Data subject's rights*. The Directive provides certain rights to the data subject, personal data of which are being processed, e.g.:
   - right to obtain information on processed personal data;
   - right to erasure or rectification of information;
   - right to object to the processing of personal data;
   - right to receive compensation for unlawful processing of personal data.
5) *Data safety* (Article 17 of the Directive). The Directive provides that the controller must implement appropriate technical and organisational measures to protect personal data. These measures must be appropriate to the existing situation or risks related to data processing.
6) *Data transfer to third parties.* The Directive sets the general principal: transfer to a third country of personal data which are undergoing processing or are intended for processing after transfer may take place only if, without prejudice to compliance with the national provisions adopted pursuant to the other provisions of this Directive, the third country in question ensures an adequate level of protection.

These principles are applied to the processing of personal data in e-health systems as well.

The Working Document WP131 of the Article 29 Data Protection Working Party[22] states that data controllers collecting data in the context of electronic health records (EHR) applications must comply with the general data protection principles, including the following:

- Use limitation principle (purpose principle): This principle partially embodied in Article 6(1)(b) of the Directive, among others, prohibits further processing which is incompatible with the purpose(s) of the collection;
- The data quality principle: This principle in the Directive requires personal data to be relevant and not excessive for the purposes for which they are collected. Thus, any irrelevant data must not be col-

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[21] *Ibid.*, art. 8.

[22] Article 29 Working Party [accessed 11-12-2014]. <http://ec.europa.eu/justice/data-protection/article-29/index_en.htm>.

lected and if it has been collected it must be discarded (Article 6(1)(c)). It also requires data to be accurate and kept up-to-date.

- The retention principle: This principle requires personal data to be kept for no longer than is necessary for the purpose for which the data were collected or further processed.
- Information requirements: Pursuant to Article 10 of the Directive data controllers processing information in electronic health record systems must provide certain information to data subjects, such as information on the identity of the controller, on the purposes of the processing, on the recipients of the data and on the existence of a right of access.
- Data subject's right of access: Article 12 of the Directive provides data subjects with the ability to check on the accuracy of the data and to ensure that the data are kept up to date. These rights fully apply to the collection of personal data in electronic health record systems.
- Security related obligations: Article 17 of the Directive imposes an obligation upon data controllers to implement appropriate technical and organisational measures to protect personal data against accidental or unlawful destruction or unauthorised disclosure.[23]

The Directive differentiates between regular and sensitive personal data. Sensitive personal data are data revealing "*racial or ethnic origin, political opinions, religious or philosophical beliefs, trade-union membership, and the processing of data concerning health or sex life*".[24] Article 29 Working Party are of the view that all data contained in electronic health record systems should be considered to be "sensitive personal data" subject to all liabilities of data controllers in relation to that.[25]

The following aspects of personal data processing related to e-health are important in the context of the Directive: general prohibition to pro-

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[23] Working Document on the processing of personal data relating to health in electronic health records (EHR). 00323/07/EN, WP 131. Brussels, 2007 [accessed 02-12-2014]. <http://ec.europa.eu/justice/policies/privacy/docs/wpdocs/2007/wp131_en.pdf>.

[24] Directive of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data, 95/46/EC. *Official Journal*, 1995/ L 281 [accessed 08-12-2014]. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31995L0046:en:HTML>, art. 8, part 1.

[25] Working Document on the processing of personal data relating to health in electronic health records (EHR). 00323/07/EN/WP 131. Brussels, 2007 [accessed 02-12-2014]. <http://ec.europa.eu/justice/policies/privacy/docs/wpdocs/2007/wp131_en.pdf>.

cess personal data concerning health. Article 8 (1) of the Data Protection Directive 95/46/EC prohibits the processing of personal data concerning health in general. However, there are exemptions to the general prohibition of processed medical data. Those exemptions are provided in Article 8 (2) and (3) and Article 8 (4):

a) Article 8 (2) a) "Explicit consent".

According to Article 8 (2) (a) of the Directive, Paragraph 1 of this Article shall not apply where (i.e. the general prohibition of processing medical data is not applied): "*the data subject has given his explicit consent to the processing of those data, except where the laws of the Member states provide that the prohibition referred to in paragraph 1 may not be lifted by the data subject's giving his consent*".

Therefore, a justification for the processing of personal data can be the **consent** of the data subject. Such consent must be given freely, be specific, sensitive and be a relevant expression of the data subject's will.

A "specific" consent means that the consent may not be related to general processing of personal data in the future. The consent must be related to specific data processing activities.

Prior to giving the consent, the data subject must be informed on all essential conditions of data processing (informed consent).

"Explicit consent" for the processing of sensitive data concerning health also means the application of opt-in solutions, while opt-out solutions do not meet the requirements of the Directive.

b) Article 8 (2) c) "Vital interests of the data subject".

The processing of sensitive personal data can be justified if it is necessary to protect the vital interests of the data subject or of another person where the data subject is physically or legally incapable of giving his consent. However, this should be an exception and could not be used to justify all cases of processing of personal medical data.

c) Article 8 (3) "processing of (medical) data by health professionals".

According to Article 8 (3), "*Paragraph 1 shall not apply where processing of the data is required for the purposes of preventive medicine, medical diagnosis, the provision of care or treatment or the management of health-care services, and where those data are processed by a health professional subject under national law or rules established by competent national bodies to* *the obligation of professional secrecy or by another person also subject to an equivalent obligation of secrecy*".

According to the opinion, this exception should not be applied for further processing which is not required for the provision of such treatment services, e.g. medical research, etc.

d) Article 8 (4) "substantial public interest exemptions".

The Directive provides that "*Subject to the provision of suitable safeguards, Member States may, for reasons of substantial public interest, lay down exemptions in addition to those laid down in paragraph 2 either by national law or by decision of the supervisory authority*".

A Member State should communicate the use of the above exemption to the Commission. In addition, this exemption should be provided and applied specifically in legislation and ensure appropriate safeguards.

It is paramount to note that according to the Article 29 Working Party, the introduction of electronic health record systems may be equalled to substantial public interest. Thus, there should be a possibility to use this exemption in practice.

The Article 29 Working Party gives details on the following 11 topics related to privacy and personal data protection and electronic health records that require particular attention in order to guarantee the data protection rights of patients[26]:

1) Personal self-determination concerning personal data processing.

Even when an electronic health record system is not supported by personal consent (as a legitimate criterion for data processing), the individual self-determination concerning personal data processing should have a great importance:

- Data subject should have a possibility to assign personal data to different degrees;
- Data subject should have a possibility to prevent data disclosure;
- Data subject should have a possibility to withdraw from electronic health records system.

2) Identification and authentication of patients and healthcare professionals.

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[26] *Ibid.*

Reliable identification of patients in electronic health record systems is of crucial importance. Situations when medical data of one person are used for another person or when an unauthorised person has access to medical data belonging to someone else are completely unacceptable.

Health cards on smart card basis could contribute significantly to a proper electronic identification of patients and also to their authentication.

Therefore, there should be a system developed in practice to allow for safe identification.

3) An authorization for accessing electronic health record in order to read and write in the electronic health record.

The essential principle according to the Directive concerning access to an electronic health record have to ensure that only those member of staff of healthcare institutions which are directly involved in provision of medical services, may have access to electronic health records. There must be a relationship between the current treatment and a doctor who is logging in.

In addition, it also seems necessary to regulate categories of healthcare professionals having access to data contained in electronic health records.

Also, the patient should be given the chance to prevent access to his electronic health record data if he so chooses. The requirement is the advance warning of the patient regarding a healthcare professional wanting to access his electronic health record.

Then, there is a question of whether patients should enter data into their electronic health records themselves. In general, such right could be granted, yet, the records should separately define information that could not be altered by the patient.

4) Use of electronic health record for other purposes.

Article 29 Working Party is of the opinion that, for the purpose of construing the Directive, accessing medical data in an electronic health record for purposes other than treatment should in principle be prohibited.

Processing of electronic health record data for the purposes of statistics and other similar purposes could be allowed only when the available personal data are anonymised.

5) The organisational structure of an electronic health record system.

Centralised data storage systems, according to the Directive, pose a greater risk. Thus, increased safety and other measures shall be taken in regards to such systems.

6) Categories of data stored in electronic health records.

Only relevant information should be entered into an electronic health record. The electronic health record should not contain an excessive amount of data.

It might be useful to create different data modules within an electronic health record system with different access requirements.

7) International transfer of medical records.

If possible, only anonymised data should be transferred to third countries. Special attention should be given to data security aspects.

8) Data security.

Access by unauthorised persons to e-health systems must be prohibited. Privacy enhancing technologies should also be applied.

In addition:

- Documentation of all processing steps which have taken place within an e-health system.
- Data should be backed up.
- Data should be cryptographed.
- Clear and documented instructions to all authorised personnel on how to properly use electronic health record systems.
- The distinction between functions and competencies of persons accessing e-health systems.
- Regular internal and external data protection audits.

9) Transparency.

Transparency concerning the content of e-health systems and the functioning of such systems should be implemented.

10) Liability issues.

Liability for infringements of privacy, including mechanisms of compensation for personal injuries, shall be implemented.

11) Control mechanisms for processing data in electronic health records.

A special arbitration procedure should be set up for disputes regarding the correct use of data in electronic health record systems. A single particular institution must be made responsible towards the data subjects for, inter alia, the proper handling of access requests. Also, a special routine for informing the data subject when and who accessed data in his electronic health records could be introduced.

Thus, general data protection provisions must be observed in order to ensure privacy and personal data protection in e-health systems. Also, consideration of the opinion of the Article 29 Working Party is relevant for processing of personal data in healthcare systems.

1.1.5.2. European Parliament legislative resolution of 12 March 2014 on the proposal for a regulation of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data and on the free movement of such data (draft General Data Protection Regulation)

On 25 January 2012, the European Commission proposed a comprehensive 1995 EU personal data rules reform to improve online privacy rights and boost European digital economy. Due to technological advances and globalisation, the way data is collected, used and accessed has changed significantly. In addition, 27 EU Member States have implemented the 1995 rules differently, which led to differences in application.

Based on the Commission proposals, the principles of the Data Protection Directive are updated and modernised, aiming to ensure the right to privacy, including e-health systems. A political communication, which sets out the Commission's objectives and two legislative proposals was adopted: a regulation[27] establishing a common EU data protection system and the directive on the protection of individuals with regards to the processing of personal data by competent authorities for the purposes of prevention, investigation, detection, or prosecution of criminal offenses or the execution of criminal penalties, and the free movement of such data.[28]

<u>The following are the main amendments envisaged in the Regulation, which will also be valid in the healthcare sector</u>:

- The same data protection rules are applicable to the EU. Unnecessary administrative requirements, such as the requirements to report data processing, will be eliminated. This means that managers of e-

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[27] Proposal for a Regulation of the European Parliament and of the Council on the protection of individuals with regards to the processing of personal data and on free movement of such data (General Data Protection Regulation). COM(2012)11 final, 2012 [accessed 02-12-2014]. <http://ec.europa.eu/justice/data-protection/document/review2012/com_2012_11_en.pdf>.

[28] Hereinafter this directive will not be discussed for the reason that it is not related with heath protection.

health systems will not have the obligation to report processing of medical data.

- Companies and organisations must report serious data breaches to the national supervising authority as soon as possible (within 24 hours, if possible). In practice, they need to report health data violations as well.
- Organisations need to communicate only with one national data protection authority in the EU state where the organisation has its headquarters. Individuals will also be able to contact their national data protection authority, even when their data are processed by a company in a non-EU country. It is explicitly determined that a consent to the processing of data, when it is needed, must be explicit, not supposed.
- Individuals will have an easier access to their data and the transfer of personal data from one service provider to another (right to data portability). This right is likely to apply to e-health systems as well.
- "Right to be forgotten" will help people to manage better Internet threats to data protection. They will be able to erase their data if there is no legal basis for storage. This right should be valid in e-health systems, although with certain exceptions.
- "Privacy by design" principle is introduced. It represents a new category of protection of privacy, embodying 7 protection principles aiming at the highest global standards of privacy protection. This principle implies that the creation of any e-health system involves the discussion of privacy issues starting from the initial stage;
- Stimulation of the use of privacy enhancing technologies (PET);
- EU rules must apply if personal data are processed abroad by companies that are active on the EU market in providing their services to EU citizens. In case of e-health systems, these rules will apply in regards to foreign health service providers operating in Lithuania (if available in the future).
- Independent national data protection authorities will be strengthened to ensure better observation of the EU rules in their countries. They will be able to punish companies or organisations that are in breach of the EU data protection rules. Penalties could amount to EUR 100 million or 5% of annual turnover.

The following are the provisions of the draft regulation relating to the processing of the data concerning health.

Already the proposal for a regulation's Recital 42 regulates that "*derogating from the prohibition on processing sensitive categories of data should also be allowed if done by a law, and subject to suitable safeguards, so as to protect personal data and other fundamental rights, where grounds of public interest so justify and in particular for health purposes, including public health and social protection and the management of health-care services, especially in order to ensure the quality and cost-effectiveness of the procedures used for settling claims for benefits and services in the health insurance system, or for historical, statistical and scientific research purposes*".[29] This section of the preamble, in fact, states that sensitive data relating to the data concerning health can be processed if provided for in the national laws and if suitable safeguards are ensured. Thus, it is attempted to provide for the health area an exemption from the general rule of restricting processing of sensitive data.

The provisions of the draft regulation's Recital 122a are rather significant. This section regulates the data, with which a relevant health profession should work: "*A professional who processes personal data concerning health should receive, if possible, anonymised or pseudonymised data, leaving the knowledge of the identity only to the General Practitioner or to the Specialist who has requested such data processing*".[30]

The draft regulation's Recital 123 states that "*the processing of personal data concerning health may be necessary for reasons of public interest in the areas of public health, without the consent of the data subject*". This provision indicates that obtaining consent (for which relevant requirements are set) from a data subject is not required to process personal data concerning health. In addition, this section reads that "*in that context, 'public health' should be interpreted as defined in Regulation (EC) No 1338/2008 of the European Parliament and of the Council, meaning all elements related to health, namely health status, including morbidity and disability, the determinants*

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[29] Proposal for a Regulation of the European Parliament and of the Council on the protection of individuals with regards to the processing of personal data and on free movement of such data (General Data Protection Regulation). COM (2012) 11 final, 2014 [accessed 02-12-2014]. <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P7-TA-2014-0212+0+DOC+XML+V0//LT>, part 142.

[30] *Ibid.*, part 122a.

having an effect on that health status, healthcare needs, resources allocated to healthcare, the provision of, and universal access to, healthcare as well as healthcare expenditure and financing, and the causes of mortality".[31]

Moreover, Article 4 of the draft regulation provides a definition of data concerning health. Data concerning health means any personal data which relates to the physical or mental health of an individual or to the provision of health services to the individual.[32] Such definition is very broad and can, in fact, cover any information on a patient.[33] The draft regulation has a separate article intended for processing of data concerning health, i.e. Article 81 "Processing of personal data concerning health".

According to the new proposed amendments to this Article, the Article's recital is as follows:

"In accordance with the rules set out in this Regulation, in particular with point (h) of Article 9(2), processing of personal data concerning health must be on the basis of Union law or Member State law which shall provide for suitable, consistent, and specific measures to safeguard the data subject's interests and fundamental rights, to the extent that these are necessary and proportionate, and of which the effects shall be foreseeable by the data subject, for:

a) *the purposes of preventive or occupational medicine, medical diagnosis, the provision of care or treatment or the management of health-care services, and where those data are processed by a health professional subject to the obligation of professional secrecy or another person also subject to an equivalent obligation of confidentiality under Member State law or rules established by competent national bodies; or*
b) *reasons of public interest in the area of public health, such as protecting against serious cross-border threats to health or ensuring high standards of quality and safety, inter alia for medicinal products or medical devices, and if the processing is carried out by a person bound by a confidentiality obligation; or*
c) *other reasons of public interest in areas such as social protection, especially in order to ensure the quality and cost-effectiveness of the pro-*

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[31] *Ibid*., part 122a.

[32] *Ibid*., art. 4, part 12.

[33] Ministry of health of the Republic of Lithuania. Analysis how national e.health system is implemented, final report. Vilnius, 2011.

cedures used for settling claims for benefits and services in the health insurance system and the provision of health services. Such processing of personal data concerning health for reasons of public interest shall not result in data being processed for other purposes, unless with the consent of the data subject or on the basis of Union or Member State law.

  - *1a. When the purposes referred to in points (a) to (c) of paragraph 1 can be achieved without the use of personal data, such data shall not be used for those purposes, unless based on the consent of the data subject or Member State law.*
  - *1b. Where the data subject's consent is required for the processing of medical data exclusively for public health purposes of scientific research, the consent may be given for one or more specific and similar researches. However, the data subject may withdraw the consent at any time.*
  - *1c. For the purpose of consenting to the participation in scientific research activities in clinical trials, the relevant provisions of Directive 2001/20/EC of the European Parliament and of the Council 48c shall apply.*

2. *Processing of personal data concerning health which is necessary for historical, statistical or scientific research purposes shall be permitted only with the consent of the data subject, and shall be subject to the conditions and safeguards referred to in Article 83.*
   - *2a. Member States law may provide for exceptions to the requirement of consent for research, as referred to in paragraph 2, with regard to research that serves a high public interest, if that research cannot possibly be carried out otherwise. The data in question shall be anonymised, or if that is not possible for the research purposes, pseudonymised under the highest technical standards, and all necessary measures shall be taken to prevent unwarranted re-identification of the data subjects. However, the data subject shall have the right to object at any time in accordance with Article 19.*
3. *The Commission shall be empowered to adopt, after requesting an opinion of the European Data Protection Board, delegated acts in accordance with Article 86 for the purpose of further specifying public*

> *interest in the area of public health as referred to in point (b) of paragraph 1 and high public interest in the area of research as referred to in paragraph 2a.*
>
> *3a. Each Member State shall notify to the Commission those provisions of its law which it adopts pursuant to paragraph 1, by the date specified in Article 91(2) at the latest and, without delay, any subsequent amendment affecting them.*"[34]

In summary, it can be stated that the draft regulation mainly focuses on the institution of consent. It regulates the cases where health data can be processed without the consent and cases where prior consent is needed. Such expected regulation should be seen as a consistent set of measures to ensure the interests of the data subject in regards to the processing of health data.

The Data Protection Regulation should enter into force two years after the adoption. The Commission's proposal is currently under consideration. It is claimed that the discussion of this draft is the largest in the entire EU legislative history. Since provisions of the Regulation are subject to various discussions, its final text may still change.

1.2. Legal regulations on e-health in some foreign countries

As already mentioned above, legal regulation on e-health is coordinated and influenced to some extent at the regional level – the European Union. Further in the text, selected Member States of the European Union, and other foreign countries will be analysed. George, Whitehouse and Duquenoy stated that in Europe, different models of electronic health record are used: a decentralised approach, a centralised model and a patient-related centralised model. These models represent different choices with regard to the retention, access and records management.[35] How are these and other e-health issues governed by legal acts of certain specific EU Member States?

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[34] Proposal for a Regulation of the European Parliament and of the Council on the protection of individuals with regards to the processing of personal data and on free movement of such data (General Data Protection Regulation). COM(2012)11 final, 2014 [accessed 02-12-2014]. <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P7-TA-2014-0212+0+DOC+XML+V0//LT>, art. 82.

[35] George C., Whitehouse D., Duquenoy P. eHealth: Legal, Ethical and Governance Challenges. Berlin, Springer-Verlag, 2013, P. 37.

1.2.1. Legal regulations on e-health in the United Kingdom

It is said that there has been no specific legislation[36] on electronic health records in England so far. However, certain legislative acts regulate medical records or other electronic aspects of e-health. For example, in 2007 the Department of Health and other institutions issued integrated guidelines on IT equipment and access to patients' data. This document highlighted the need to respect confidentiality, which is a constituent part of the code of conduct of the regulatory authorities, managing registered health professionals. The document also draws attention to other two sets of guidelines issued by the Department of Health: in 2003, guidelines on confidentiality and in 2005, guidelines on guarantees for healthcare records. These two documents highlight a patient's right to access his/her health records, the right to control other entities' access, the possibility to restrict further access and the right to access in case of emergency.

It should be noted that the integrated guidelines cited three framework documents:

- Human Rights Act of 1998;
- Data Protection Act of 1998; and
- The Common Law Duty of Confidence.

The Department of Health has also issued guidelines for records management. The first part was issued in 2006, and the second – in 2009. As an example, the guidelines established minimum terms to be respected in retention of health records.

The demographic and health data of a person in the UK is stored centrally, in the Spine system. Direct access to Spine or to the services, which lead to relevant data, is controlled by the Access Control Structure. Organisations have access to the system through the Registration Authorities. Individuals may login only with a smart card. This card at the moment of issuance is installed with access rights and their restrictions.[37]

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[36] Overview of the national laws on electronic health records in the EU Member States. National Report for United Kingdom (England). Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_united_kingdom_en.pdf>, P. 3.

[37] Whitehouse, D., Giest, S. Country Brief: England. e-Health Strategies Report, 2010 [accessed 01-12-2014]. <http://www.ehealth-strategies.eu/database/documents/England_CountryBrief_eHStrategies.pdf>.

Certain changes to the legislation in England had to be made due to e-prescriptions. Traditionally, the prescriptions were issued as a hardcopy and traditionally signed. However, in 2005 the regulations on the National Healthcare Services defined that upon the consent of the patient, healthcare providers can also issue prescriptions electronically.

It should be noted that electronic health records and electronic prescription services in the United Kingdom are fully integrated; they are accessible through a single system.[38] Therefore, a centralised model of electronic health records is used.

Patients' rights as far as health data are determined in various sources of the English law. One legal act should be underlined: the Access to Health Records Act. A patient has the right to apply for access to his/her data, or to request a copy of the data for a fee. The patient also has the right to obtain information on who and when accessed his/her health data.[39]

In the UK, respect to the institutions of confidentiality and consent are of utmost importance while providing healthcare services. A healthcare record could serve as an example. There is a prior presumed consent model established in England. The patient is informed in writing of the development of his/her healthcare record and is given a period of time (usually, two to three months) to object. The patient may add additional demographic information to his/her health record as well as other non-clinical information. The patient has no right to change clinical information, but may ask to correct mistakes. The national council responsible for management of information established guidelines that govern the requirements to improve health and social records. These guidelines were approved in 2010.

In the future, patients will be able to require certain information to be sealed and locked. However, the patient health record will have an icon showing that certain information has been sealed.

Liability for abuse or neglect in processing of data contained in an electronic health record is not primarily regulated. In such cases, general li-

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[38] Overview of the national laws on electronic health records in the EU Member States. National Report for United Kingdom (England). Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_united_kingdom_en.pdf>; p. 5.

[39] Whitehouse, D., Giest, S. Country Brief: England. e-Health Strategies Report, 2010 [accessed 01-12-2014]. <http://www.ehealth-strategies.eu/database/documents/England_CountryBrief_eHStrategies.pdf >.

ability provisions apply as electronic health records and paper documents related to health are treated as equal.[40]

1.2.2. Legal regulations on e-health in Ireland

In Ireland, the domain of e-health should be governed by the Health Information Bill. The need for this piece of legislation emerged in the National Health Strategy of 2001 and the National Health Information Strategy of 2004. However, this piece of legislation is still under development.

The key objectives stated in the Draft Bill are as follow:

- To define legislation that will enable the use of information for improving healthcare and patient safety;
- To promote the use of information technologies, aiming at improvement of services provided to patients;
- To set an effective information management structure for the health system as such.

This Bill will also define the rights of patients to access information in electronic health records.

Even though it is stated that Ireland has no specific legal regulation related to electronic health records[41], the National Health Information Strategy[42] of Ireland of 2004 dedicated a separate chapter to an electronic health record. This strategy discusses the concept of electronic health records and presents conceptual assumptions regarding electronic health records. The strategy states that with regard to the interoperability of electronic health records, a national, coordinated and integrated approach is necessary. Information systems of individual healthcare institutions will be modified, taking into account the national aspect.[43]

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[40] Overview of the national laws on electronic health records in the EU Member States. National Report for United Kingdom (England). Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_united_kingdom_en.pdf >, p. 46.

[41] Overview of the national laws on electronic health records in the EU Member States. National Report for Ireland. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_ireland_en.pdf>, p. 3.

[42] Health Information: a National Strategy. Ireland, 2004 [accessed 01-12-2014]. <http://www.dohc.ie/publications/pdf/nhis.pdf?direct=1>.

[43] *Ibid.*, p. 58.

In 2014, Ireland adopted the Health Identifiers Bill. The absence of a unified identifier has been taken as one of the major deficiencies of the health information infrastructure in Ireland. It is believed that individual health identifiers will help to ensure that a particular person at the appropriate time will be coupled with adequate information, avoiding duplication of information, etc.

The Bill also protects the privacy of individuals and is in line with data protection legislation of Ireland.[44]

It should be noted that Ireland has no specific law governing the consent to process information in electronic health records. In this case, the general requirements for data protection apply. In accordance with these requirements, a consent has to be obtained for medical data management with an exception for certain identified cases. Furthermore, patients must be informed about their data controller and purposes, which are the basis for the processing of personal data.[45]

Liability for abuse or neglect in processing of data in the electronic health record is not specially regulated in Ireland, just as in the United Kingdom. In such cases, general liability provisions apply (including the area of privacy protection).[46]

1.2.3. Legal regulations on e-health in Estonia

Estonia is considered to be one of the leading countries in the area of e-health.[47] The Estonian National Health Plan[48] mentions that Estonia supports innovative solutions in medicine. It indicates that Estonia will estab-

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[44] Gantly, D. Law to bring in individual health identifiers enacted. Irisch Medical Times, 2014-07-15 [accessed 02-12-2014]. <http://www.imt.ie/news/latest-news/2014/07/law-to-bring-in-individual-health-identifiers-enacted.html >.

[45] Overview of the national laws on electronic health records in the EU Member States. National Report for Ireland. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_ireland_en.pdf>, p. 16.

[46] *Ibid.*, p. 26.

[47] Overview of the national laws on electronic health records in the EU Member States. National Report for the Republic of Estonia. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_estonia_en.pdf >, p. 3.

[48] National Health Plan 2009–2020. Estonia. [accessed 04-12-2014]. <http://pns.dgs.pt/files/2010/03/pnsest.pdf >.

lish the national e-health information system: digital patient records, digital medical records and digital prescriptions.[49]

The Ministry of Social Affairs is responsible for regulation and supervision of the health system in Estonia. Health legislation (laws) is implemented by the Government or the secondary ministerial legislation. The Ministry of Social Affairs also develops health programmes (strategic plans), which are supposed to be developed in accordance with guidelines laid down by the Ministry of Finance and have to be approved by the Government in order to receive appropriate financing from the budget.

20 December 2007, the Estonian Parliament passed the law amending the Health Services Organisation Act. This law provides the legal framework for developing e-health projects, such as the Electronic Health Record, Digital Image and Digital Registration. The new law aims to unify information systems into one centralised health information system.

The main idea of this Law is to enable processing of various medical documents in electronic form. It is planned to replace all paper documents with digital files.

Article 59–2 of the Law establishes that healthcare providers are required to present data to electronic health records. It is governed that only the healthcare employee, who is directly supervising the patient and coordinating treatment, can access and analyse the patient's medical data. Taking an interest in patient health data for other than therapeutic purposes is prohibited.

An electronic patient health records in Estonia is designed automatically unless the patient objects to it. The patient is given access to his/her electronic health records. However, he/she is not allowed to make any amendments. The Health Services Organisation Act establishes that healthcare providers may set a deadline for the data to be loaded into the Health Information System; during this period patients may learn about their health data only from healthcare professionals. It is important to note that a patient's access to health data stored in the Health Information System can be limited to not more than 6 months, and only if the healthcare provider believes it to be necessary for protection of life or health of the

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[49] *Ibid.*, p. 6.

patient. Such an arrangement is aimed at withholding patients from having access to information within the Health Information System until the doctor has an opportunity to explain to him/her the meaning of this information.[50]

According to the Act, patients can use the Patients' Portal for exercising their right to restrict access to health data. The system usually warns such patients whose actions in restricting the use of information can be harmful to the patient (as doctors will no longer be able to see certain important information). However under the Act, the patient assumes the full responsibility for the restriction of the access to data (upon such restrictions, data access is not granted even in emergency situations).[51]

The main issues regarding patients' rights and legislation, which are currently under discussion in Estonia, are as follow:

- Patient access;
- Misuse of data;
- Deletion of data files;
- General practitioner access (especially when it comes to psychiatric illnesses);
- Restrictions on the use of data.

There is an opinion that Estonia needs a new law which would regulate the collection of medical data, especially with regard to electronic health records. Also, it is believed that there is a necessity for changes in legislation, governing the protection of personal data.

As far as the liability for the misuse or negligence in processing of personal data in electronic health records is concerned, Estonian legislation does not stipulate specific liability. Therefore, general liability provisions apply.[52]

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[50] Ministry of health of the Republic of Lithuania. Analysis how national e.health system is implemented, final report. Vilnius, 2011, p. 44.

[51] Overview of Estonian Electronic Health Record (EHR) System. 2010 [accessed 03-12-2014]. <http://www.e-tervis.ee/index.php/en/news-and-arcticles/432-overview-of-estonian-electronic-health-record-ehr-system>.

[52] Overview of the national laws on electronic health records in the EU Member States. National Report for the Republic of Estonia. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_estonia_en.pdf>, p. 37.

1.2.4. Legal regulations on e-health in Latvia

The legal framework applicable to the National Health Service is determined in the Latvian Medical Treatment Law, Chapter 14.[53] Currently, Latvia is also developing secondary legislation for implementing the aforementioned legal framework regulation.

Latvia has separate laws and pieces of legislation governing the following areas related to e-health: personal data protection, telecommunications, electronic signatures and responsibility for health IT products. In addition, it plans to pass a piece of legislation governing the regional/national patient data systems and the exchange of this information. The idea is to use a centralised data repository, but some data would remain in systems of healthcare providers. The legislation will establish the parties responsible for the administration of data.[54]

Specialised legal regulation for e-health in Latvia has been limited so far. There seems to be a lack of a legal framework of electronic health records and telemedicine. The accreditation scheme for telemedicine services has not yet become legitimate. However, the legal framework in the area of e-prescriptions was adopted in 2006.

Until 2009, Latvia had no special legal regulation on patients' rights either. Patients' rights and obligations have been regulated by framework laws: Medical Treatment Act and Medical Practitioner Act. In 2009, Patients' Rights Act was adopted. The law establishes the following rights of patients:

- The right to information;
- The right to medical treatment;
- The right to accept or refuse treatment;
- The right of free choice;
- The right to medical information.[55]

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[53] Overview of the national laws on electronic health records in the EU Member States. National Report for Latvia. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_latvia_en.pdf>, p. 3.

[54] Šitcs M., Giest, S., Dumortier, J., Artmann, J. Country Brief: Latvia. e-Health Strategies Report, 2010 [accessed 01-12-2014]. <http://www.ehealth-strategies.eu/database/documents/Latvia_CountryBrief_eHStrategies.pdf >.

[55] Health Systems in Transition (HiT) profile of Latvia, The Health Systems and Policy Monitor [accessed 03-12-2014]. <http://www.hspm.org/countries/latvia08052014/livinghit.aspx?Section=2.9%20Patient%20empowerment&Type=Secton>.

Still, the new Patients' Rights Act does not precisely regulate the use of new medical techniques, e.g., telemedicine, electronic health records or electronic prescriptions.[56]

The general principle in Latvia regarding consent to processing the data for medical purposes says that a prior patient consent is not required. The data controller is not obliged to inform the data subject about his/her health data processing unless such information is required by the patient.[57] Latvian laws do not stipulate specific liability related to electronic health records.[58]

1.2.5. Legal regulations on e-health in Finland

The main piece of legislation that governs electronic health records in Finland is the Act on Electronic Health Records with its most recent amendments, which came into force on 1 April 2014.[59] In addition, the electronic health record is regulated by the Decree on National EHR System Services.

Finland has several important legal acts related to the area of e-health:

- Personal Data Protection Act of 1999;
- Decree on Patient Data Retention of 2001;
- Act on Customer Data Protection of 2007;
- Act on ePrescription of 2007.

The Personal Data Protection Act stipulates that a Healthcare Unit (institution) or a healthcare professional handles personal data for healthcare purposes. The Act provides conditions pertaining to the exchange of information (i.e. patient data) among the owners of different registers; also, it establishes requirements for the storage of information in the form of data logs. One of the articles states that sensitive personal data must be erased as

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[56] Šitcs, M., Giest, S., Dumortier, J., Artmann, J. Country Brief: Latvia. e-Health Strategies Report, 2010 [accessed 0-12-2014]. <http://ehealth-strategies.eu/database/documents/Latvia_CountryBrief_eHStrategies.pdf>, p. 24-25.

[57] Overview of the national laws on electronic health records in the EU Member States. National Report for Latvia. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_latvia_en.pdf>, p. 16.

[58] *Ibid.*, p. 25.

[59] Overview of the national laws on electronic health records in the EU Member States. National Report for Finland. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_finland_en.pdf>, p. 3.

soon as the reason for handling is no longer valid. The reason for processing of such data must be reassessed at least every five years.[60]

The Decree on Patient Data Retention of 2001 regulates the management of medical records (laboratory tests). In a rather detailed manner, the decree regulates the design and development of patient data storage systems, the right to access documents, the right to make amendments to documents, the minimum amount of information recorded with regard to a particular patient, records in a disease and treatment time, etc.

The Act on Customer Data Protection of 2007 governs the services for archiving, encoding and certification as well as data on patient access. This act regulates the right of patients to access health records, which should be kept updated and safely stored. Medical records have to be stored in an electronic form. Starting with 2011, the act sets forth the requirement to use electronic archiving systems both for private medical institutions and public medical institutions, which do not use paper hardcopy archives. Article 11 of the Act regulates that a health record consists of the general medical record and the record of the patient's consent. One general medical record must be available for each patient (the record is supervised by the general practitioner). The Act also provides that the national e-archiving service for electronic patient health records should be supported by the Social Insurance Institution (Kela). Individuals should be able to access their health data, including access to health record logs, and to make copies.[61]

According to the Act, the data is processed in the KANTA system. This means that Finland has chosen a centralised electronic health records system.[62] Centralised handling of health data does not require prior consent from the patient. However, where the data controller connects to the centralised data management system, the patient is notified about it.[63]

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[60] Doupi P., Renko, E., Hamalainen, P., Makela, M., Giest, S., Dumortier, J. Country Brief: Finland. e-Health Strategies Report, 2010 [accessed 01-12-2014]. <http://www.ehealth-strategies.eu/database/documents/Finland_CountryBrief_eHStrategies.pdf>.

[61] *Ibid.*

[62] Dumortier, J., Verhenneman, G. Legal Regulations on Electronic Health Records: A Prerequisite or an Unavoidable By-Product? - The Legal Aspects of Electronic Health Records in Europe and the US Analysed. / ICRI Research Paper, 2011 (5) [accessed 03-12-2014]. <http://papers.ssrn.com/sol3/papers.cfm?abstract _id=1975758>.

[63] Overview of the national laws on electronic health records in the EU Member States.National Report for Finland. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/

According to the legislation on e-prescriptions and the relevant decree of the Ministry of the Social Affairs and Health, e-prescriptions obtained the legitimate status in 2008. It also sets forth that KELA is to manage the central national database of electronic prescriptions. Although no patient consent is required for an electronic prescription, patients, however, have the right to refuse an e-prescription and receive a hardcopy.

The Finnish legislation does not have any specific liability requirements related to the use of electronic health records. In case of misuse or negligence, general rules governing healthcare and proper patient care apply.[64]

1.2.6. Legal regulations on e-health in Sweden

The Patients Data Act of 2008 is one of the most relevant pieces of legislation in the area of e-health in Sweden. On the one hand, this act allows medical staff to access online electronic medical records of patients and establishes possibilities for the national dissemination of locally stored information. On the other hand, the act strengthens the involvement of patients by enabling patients to set up restrictions on access to their medical information, as well as allows them to view information on access to their medical records.

It is considered that this act also regulates electronic health records. All data stored in electronic health records (including e-prescriptions) have to be handled in accordance with this Act. Certain specific issues are regulated by specific pieces of legislation; however, all of them must comply with this Act.[65]

Part 5 of Chapter III of the Act stipulates that a patient's log may contain only personal data which is necessary for the purposes mentioned in the Act.[66] Meanwhile, Part 1 of Chapter IV regulates that health professionals can access patient records only if they are involved in the treatment of that particular patient or for other important reasons, if the information is required for work-related purposes. It should be noted that other medi-

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ehealth/docs/laws_finland_en.pdf>, p. 15.

[64] *Ibid*., p. 22.

[65] Overview of the national laws on electronic health records in the EU Member States.National Report for Sweden. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_sweden_en.pdf>, p. 3.

[66] *Ibid*., p. 3.

cal institutions can access medical data of patients only with their consent. Besides, patients may choose to block certain data which then can be accessed by no one.[67] Should certain data be blocked, a risk analysis has to be performed, which provides information to the patient about possible consequences of data blocking.[68]

The Act provides for electronic health records to be processed for all supervised patients.[69] Data in electronic health records is processed in a mandatory manner and such processing does not require prior consent. [70]If certain information is incorrect, the representative of personal data has a duty to correct, eliminate or block the data as soon as possible, provided such action is in line with other legislation. However, it is considered that Sweden has no central electronic health records system.[71]

Personal data in the national e-prescriptions database of Sweden are protected in accordance with the Prescription Registration Act, which has already been in force since 1997.[72] This piece of legislation complements the Personal Data Act and the Electronic Signature Act of 2001.

The Swedish legal framework does not stipulate a specific liability related to electronic health records. In case of misuse or neglect, general provisions on liability for unlawful actions apply.[73]

1.2.7. Legal regulation on e-health in Germany

The Public Health Insurance Law of Germany of 2003 establishes the main rules for modernization of the processing of information in the German healthcare system. The decision was made to set up a designated infra-

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[67] Doupi P., Renko, E., Giest, S., Heywood, J., Dumortier, J. Country Brief: Sweden – e-Health Strategies Report, 2010 [accessed 01-12-2014]. <http://ehealth-strategies.eu/database/documents/Sweden_CountryBrief_eHStrategies.pdf>.

[68] Patient Data Act for safer care, Landstinget Sormland [accessed 03-12-2014]. <http://www.landstingetsormland.se/extra-ingang/International/Patient-Data-Act-for-safer-care/Patient-Data-Act-for-safer-care-/>.

[69] *Ibid*.

[70] Overview of the national laws on electronic health records in the EU Member States.National Report for Sweden. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_sweden_en.pdf>, p. 19.

[71] *Ibid*., P. 4.

[72] *Ibid*., P. 3.

[73] *Ibid*., P. 28.

structure for health telematics in Germany. The key provisions relate to the electronic health card.[74]

As far as the general rules of law are concerned, the electronic health card at the federal level is regulated by Book V of the German Social Security Code. Under the legislation, the card is a tool or means to manage personal medical data. Respective data on the card can be handled on a mandatory or optional basis. Aiming to protect personal data of private persons, the Law defines the rights of individuals. The rights of citizens and data privacy are legally ensured by obtaining a citizen's consent (which has to be recorded in the electronic health card). This consent specifies who may and who may not have access to the patient's data, as well as information on the access history (information on at least 50 logins must be retained).[75] This Law also regulates the lifelong identifier of a patient, which identifies a citizen for health purposes, regardless of the fact whether the citizen is insured or not.

Still, the Act receives a lot of criticism as it is believed that provisions on electronic health card are too vague and abstract.[76] However, it is considered that such abstractness can provide the necessary flexibility in practice.

For e-health data to be managed in Germany, the patient's consent is required. The patient's consent is electronically recorded in the patient's card before the patient is provided with e-health services.[77]

Article 10 of the German Code of Medical Professionals states that doctors shall handle all necessary documentation in paper form or digitally. If electronic management of information is preferred, certain requirements apply from this Code as well as the German Medical Assembly Guidelines. These requirements include specifications for data protection from unau-

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[74] Which is treated as broader institute comparing with EHR.

[75] Stroetmann, K.A., Artmann, J., Giest, S. Country Brief: Germany. e-Health Strategies Report, 2010 [accessed 01-12-2014]. <http://www.ehealth-strategies.eu/database/documents/Germany_CountryBrief_eHS_12.pdf>.

[76] Overview of the national laws on electronic health records in the EU Member States. National Report for Germany. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_germany_en.pdf >, p. 3.

[77] *Ibid.*, p. 22.

thorised modification or elimination; these requirements also enforce the use of electronic signatures with a time tag.[78]

Germany also applies the general legal framework, relating to the protection of privacy, telecommunications, electronic signatures, etc. In addition, Germany launched a debate regarding further specification of patient rights.

The German legal framework does not establish a specific liability related to electronic health records. In case of misuse or neglect, general provisions on liability for unlawful actions apply.[79]

1.2.8. Legal regulations on e-health in Poland

In Poland, the new legislation made a breakthrough in the domain of e-health in 2011. At that time, the Act on the National Healthcare Information System of Poland[80] was approved. The Act came into force from the beginning of the following year. The legal reform was crucial in many fields, including telemedicine or electronic prescriptions, where the existing legal regulation in Poland had to be established in writing. The Act on the National Healthcare Information System regulates:

- Electronic medical records;
- Electronic signatures and information systems, in cases associated with certain areas of healthcare.

The Act introduced the main novelty, i.e. the Medical Information System, which provides access to data of specific patients, including to information on provided and planned healthcare services. These data are processed and submitted in an electronic form.

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[78] Dumortier, J., Verhenneman, G. Legal Regulations on Electronic Health Records: A Prerequisite or an Unavoidable By-Product? - The Legal Aspects of Electronic Health Records in Europe and the US Analysed, ICRI Research Paper, 2011 (5) [accessed 04-12-2014]. <http://papers.ssrn.com/sol3/papers.cfm?abstract_id= 1975758>.

[79] Overview of the national laws on electronic health records in the EU Member States. National Report for Germany. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_germany_en.pdf> , p. 29.

[80] Poland: Act On The National Healthcare Information System Signed. Information Policy, 2011-07-07, [accessed 03-12-2014]. <http://www.i-policy.org/2011/07/poland-act-on-the-national-healthcare-information-system-signed.html>.

Chapters of the Act are as follow:

- General rules;
- ICT systems, supporting information systems;
- Medical Information System;
- Medical records;
- Specific ICT systems;
- The rules for transferring data into the information system and the announcement of such data;
- Supervision and control of the information systems and databases;
- Amendments to the existing legislation;
- Closing provisions.[81]

The Act regulates in detail that electronic medical records can be used for sharing and collection of the data, updating medical records and making records available to healthcare institutions in accordance with specific legal rights assigned. In addition, the Act establishes a platform, the data of which is supervised by the National Information Systems Centre, which is also responsible for data security and integrity.

The following personal data are stored in electronic medical records:

- Name and surname;
- Gender, nationality, marital status, education;
- (E-mail) address;
- Social security number, taxpayer identification number;
- ID card number;
- The level of disability;
- The right to healthcare services;
- The identification number assigned by the healthcare provider.

Medical data stored in the record are as follow:

- Planned and provided health services;
- Diagnosis;
- (Date of death).

With regard to patients' rights, Poland plans to use the "opt-out" model, which stipulates that the electronic patient's record is created if the patient

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[81] Turowec, A. Giest, S., Dumortier, J., Artmann, J. Country Brief: Poland.e-Health Strategies Report, 2010 [accessed 01-12-2014]. <http://www.ehealth-strategies.eu/database/documents/Poland_CountryBrief_eHStrategies.pdf>.

does not object to it. Having created such a record, patients are granted the following rights:

- The right to request deletion of the data from the electronic health records;
- The right to restrict access to the electronic health records for certain healthcare institutions;
- The right to seal certain information stored in the electronic health records.[82]

However, it should be mentioned that due to the lack of preparation for the transition to e-health systems, the law will not become operational until August 2017.[83]

There is also a strategic document passed in Poland that sets forth guidelines for the e-health system policy for 2014–2020.

The Polish legal framework does not establish a specific liability related to electronic health records. In case of misuse or neglect, general provisions on liability for unlawful actions apply.[84]

1.2.9. Legal regulations on e-health in Austria

In Austria, the national electronic health record scheme is set in place by the Federal Act on Data Security Measures when using personal electronic Health Data (Health Telematics Act 2012).[85] It is considered that since 2012, Austria entered a new era of e-health as the act validated electronic data processing in healthcare institutions. These data are processed in the national ELGA system. Even though privacy is identified as one of the key aspects pertaining to the processing of electronic health records, it should be mentioned that the "opt-out" principle applies to the processing of health data in

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[82] *Ibid*.

[83] Overview of the national laws on electronic health records in the EU Member States. National Report for Poland. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_poland_en.pdf>, p. 3.

[84] *Ibid*., p. 26.

[85] Overview of the national laws on electronic health records in the EU Member States. National Report for Austria. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_austria_en.pdf >, p. 3.

the system, which means that patient data are entered into the system without consent. However, patients can later object to such processing of data.[86]

The Health Telematics Act regulates the exchange of health data, as well as protection measures (even though they are already governed by the Data Protection Act). The Act consists of twenty articles which regulate: the terms, functions, identity, confidentiality, integrity, records and the e-health directory. It is believed that the further development of electronic patient records depends on provisions of this Act.[87]

In terms of health data archiving, the Health Telematics Act provides for a maximum period of 10 years. Upon maturity of this period, the data must be erased.[88]

It is stated that patients in Austria have the following rights:

- The right to demand deletion of data from medical records;
- The right to demand deletion of the entire health record;
- The right to restrict access rights to medical records for certain healthcare entities;
- The right to seal certain information in medical records;
- The right to have access to medical records with the read-only function.

Non-compatibility of Austrian e-health systems with e-health systems of other EU Member States is named as one of the essential deficiencies. It should also be mentioned that Austria has no plans to switch to electronic prescriptions.[89]

Other e-health regulations and legal documents of Austria are named below:

- e-Government Act;
- Data Protection Act 2000.

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[86] *Ibid.*, p. 4.

[87] Pfeiffer, K. P., Giest, S., Dumortier, J. Country Brief: Austria. e-Health Strategies Report, 2010 [accessed 01-12-2014]. <http://www.ehealth-strategies.eu/database/documents/Austria_CountryBrief_eHStrategies.pdf>.

[88] Overview of the national laws on electronic health records in the EU Member States. National Report for Austria. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_austria_en.pdf>, p. 5.

[89] *Ibid.*, p.5.

The Austrian legal framework does not stipulate a specific liability related to electronic health records. In case of misuse or neglect, general provisions on liability for unlawful actions apply.[90]

1.2.10. Legal regulations on e-health in France

The system of French electronic health records belongs to the so-called French model "Dossier Médical Personnel" (DMP), where patients choose their provider of healthcare services for administration of their personal health record.[91] Although a written (paper) consent from a patient for processing of medical data is not required, it has to be obtained by other means.[92]

The general rule, set forth in the French Public Health Code, stipulates that any kind of health information may be handled by a healthcare institution only with a prior consent of a patient. Retention of confidential and health-related information in France is governed by the so-called Decree of 2006 on the health-related data and the Decree of 2007. The first Decree establishes the conditions for certification of hosting service providers. This Decree lists the principal duties related to confidentiality and privacy. The second Decree regulates the confidentiality of medical information stored in information systems and elaborates on the requirements for compliance with the safety standards, the rights of medical personnel, etc.

Patients' rights in France are regulated by the Law on the rights of patients and the quality of the health system of 2002. This Law introduced two new chapters to the Public Health Code: on the rights of individuals and the involvement of the health system users. The Law aims at establishing the so-called "health democracy" when every person is actively involved both in the issues of his/her health and the health system. Therefore, a person acquires not only the relevant rights but obligations as well. This includes new rights and obligations, such as the right to healthcare, the right to the

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[90] *Ibid.*, p. 28.

[91] Artmann, J., Giest, S. Country Brief: France. e-Health Strategies Report, 2010 [accessed 01-12-2014]. <http://www.ehealth-strategies.eu/database/documents/France_CountryBrief_eHStrategies.pdf>.

[92] Overview of the national laws on electronic health records in the EU Member States. National Report for France. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_france_en.pdf >, p. 26.

quality of healthcare, the right to privacy and the obligation to pay taxes and to cooperate.[93]

The right to information and access to patient files is not entirely governed by the Law on the rights of patients and the quality of the health system. However, it can be stated that these rights are regulated in the French Data Protection Act and other pieces of legislation.

In general, the Data Protection Act provides the right for patients to access their health data directly or indirectly. Healthcare representatives can access health data only in cases stipulated by law.

The French legal framework does not stipulate a specific liability related to electronic health records (DMP). In case of misuse or neglect, general provisions on liability for unlawful actions apply.[94]

1.2.11. Legal regulations on e-health in Spain

In case of Spain, three pieces of legislation should underlined:

- Law on Personal Data Protection of 1999;
- Law regulating the autonomy of patients and their rights and obligations in relation to clinical information and documentation of 2002;
- Law on the cohesion and quality of the National Health Service of 2003.

The Spanish Law on Personal Data Protection is similar to the EU regulation and the Data Protection Directive. However, with regard to the processing of health data, the law distinguishes cases when the consent from a data subject is not required, i.e., the cases where opt-out is enough instead of opt-in. Among others, a case should be mentioned when health data is required for the National Social Security Health system, even when the data transfer is made electronically.[95]

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[93] Artmann, J., Giest, S. Country Brief: France. e-Health Strategies Report, 2010 [accessed 01-12-2014]. <http://www.ehealth-strategies.eu/database/documents/France_CountryBrief_eHStrategies.pdf>.

[94] Overview of the national laws on electronic health records in the EU Member States. National Report for France. Brussels, 2014 [accessed 04-12-2014]. < http://ec.europa.eu/health/ehealth/docs/laws_france_en.pdf>, p. 35.

[95] Corbellini, A.M., Giest, S., Artmann, J., Heywood, J.D. Country Brief: Spain. e-Health Strategies Report, 2010 [accessed 01-12-2014]. <http://www.ehealth-strategies.eu/database/documents/Spain_CountryBrief_eHStrategies.pdf>.

Another regulatory element of the Law on Personal Data Protection is the decentralised retention of health data and electronic clinical records. This obligation is also established in the Law on the autonomy of the patient. This particular Law stipulates three types of health data:

- Medical and clinical documentation related to a patient's specific healthcare episode;
- Patient's medical record which contains information on the status and the medical evolution of a patient throughout the entire healthcare process;
- Medical or clinical information which refers to the acquiring or extension of knowledge on the physical and health status of a person in order to provide him better healthcare.[96]

Data stored in a decentralised manner is distributed through the National Health System. Measures are taken to make sure that healthcare personnel can only access information which is required in each specific case.

The rights of healthcare providers and patients in Spain are governed by the General Health Law of 1986. The Law establishes such rights as the right to information, the right to choose treatment options, etc. In order to create an electronic health record, an explicit consent is required. This is provided for by the General Health Law and the Law on Personal Data Protection. In addition, patients may demand deletion of data from electronic medical records and/or may block certain information. Moreover, patients, as far as the electronic health data is concerned, may require that certain information (which is treated as personally sensitive) may be accessed only by their personal physician.[97]

In general, access control received a greater attention only after the adoption of the Law 41/2002 since this law established basic rights and obligations related to electronic health information and clinical documentation. The Law provides security measures, for example, a safe access has to be ensured to the owner (the patient) and his/her respective legal representatives (if any).

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[96] *Ibid.*

[97] *Ibid.*

In addition to the laws above, the Royal Decree 4/2010 should be mentioned as it regulates the National Interoperability Framework, which requires applying the National Security Framework rules for the handling of electronic documents. Such information systems have to be audited periodically (every two years).

The Spanish legal framework does not require the prior explicit consent for the electronic processing of health data. It is assumed that that implicit consent is granted by the patient when requesting a consultation by the doctor in care processes.[98]

The Spanish legal framework does not stipulate a specific liability related to electronic health records. In case of misuse or neglect, general provisions on liability for unlawful actions apply.[99]

Consequently, the e-health legal framework in the EU Member States is currently undergoing rapid development. Among most commonly regulated issues are e-health record (even though different models are used) and electronic prescriptions. There is a tendency to regulate these institutions in fundamental rules of law. A lot of attention in the national legislation of the states involved in this survey is given to the protection of privacy in e-health systems. However, a lot of obvious differences still remain, and no unified policy and strategy exist in the legal framework of e-health. There are significant differences in regulation of the domain of e-health as well as in levels of pieces of relevant legislation. Similarly, differences in regulation exist in relation to the consent for processing of personal data for the purposes of e-health: in some cases prior consent is required and in other cases such data processing is assumed without a prior consent, which is not required. In addition, the national law in the countries under investigation does not regulate the interoperability of e-health systems with the existing e-health systems of other EU Member States. This is regarded as one of the major drawbacks. With regard to the liability issues related to misuse or neglect of processed electronic health records, all the countries under investigation practice the general liability whereas no

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[98] Overview of the national laws on electronic health records in the EU Member States. National Report for Spain. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_spain_en.pdf >, p. 4.

[99] *Ibid.*, p. 51.

specific liability arising from unlawful actions related to electronic health records is defined.

However are e-health issues regulated in countries outside the EU? To answer this question, a number of countries are analysed below.

1.2.12. Legal regulations on e-health in Norway

The Norwegian legislation does not refer to electronic medical records of patients. However, according to provisions of the Personal Health Data Filing System Act (Health Register Act) of 2001, personal health data filing systems can be processed electronically.[100]

Other key legislation in relation to health data storage and patients' rights are listed below:

- Personal Data Act of 2000;
- Patients' Rights Act of 1999 (revised in 2006);
- Electronic Communications Act of 2003 (Telemedicine);
- Act on electronic communications in public administration of 2004;
- Act on data protection of 2000.

The Personal Data Act of 2000, which replaced the Data Register Act of 1978, fully complies with requirements of Directive 95/46/EC. It is said that this particular piece of legislation establishes even stricter privacy rules than the Directive itself. Even though the overall health data management is subject to the requirement of notification, the consent for the further dissemination of the data follows the opt-in/opt-out principles.[101]

The aim of the Patients' Rights Act of 1999 is to restrict access to health information. This obligation extends to healthcare providers. The Act prohibits the overall access to health information; it can only be a delegated access. Unfortunately, the Act[102] itself does not distinguish electronic health records as such as both the rights of patients and other aspects are jointly regulated.

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[100] Overview of the national laws on electronic health records in the EU Member States. National Report for Norway. Brussels, 2014 [accessed 04-12-2014]. <http://ec.europa.eu/health/ehealth/docs/laws_norway_en.pdf>, p. 4.

[101] *Ibid*., p. 5.

[102] The Act of 2 July no. 63 relating to Patients‘ Rights [accessed 03-12-2014]. <http://home.broadpark.no/ ~wkeim/patients_rights_act.htm>.

In the area of legal regulation of medical records in Norway, the country follows the principle that each healthcare institution should administer a single healthcare record for a patient who has received or is receiving healthcare services. The data must be retained for 10 years after the last entry. Thereafter, the data is transferred to national archives.

Patients have the right to restrict access to all or a part of the health information. However, it may be subject to the priority rule if it is determined that certain information is essential for the provision of healthcare services.

The Personal Data Act of 2000 sets forth detailed rules on data protection, particularly for data security.

1.2.13. Legal regulations on e-health in Australia

In Australia starting from 1 July 2012, a legal framework package entered into force, called the PCEHR package (personally controlled e-health record). PCEHR legislation regulates how to develop the Australian eHealth programme.[103]

One of the most important pieces of legislation is the Personally Controlled Electronic Health Records Act.[104] The Act sets forth the system of access to electronic health records and regulates associated relationships. The object of the Act is defined as follows: to enable the establishment and operation of a national voluntary system for the provision of access to health information relating to consumers of healthcare, to:

- help overcome the fragmentation of health information; and;
- improve the availability and quality of health information; and;
- reduce the occurrence of adverse medical events and the duplication of treatment; and
- improve the coordination and quality of healthcare provided to consumers by different healthcare providers.

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[103] Sweeney, S. Australia passes new e-Health law. Asia Pacific Futuregov, 2012-06-28 [accessed 03-12-2014]. <http://www.futuregov.asia/articles/2012/jun/27/australia-passes-new-ehealth-law/>.

[104] Personally Controlled Electronic Health Records Act No. 63, 2012 [accessed 03-12-2014]. <http://www.comlaw.gov.au/Details/C2012A00063>.

The simplified outline of the Act is as follows:

- The second part of the Act establishes concepts and introductory provisions.
- (3) regulates the e-health system operator, the operator's functions, and the status of the advisory committee.
- (4) regulates the Registration Process for users.
- (5) specifies penalties for the illegal collection of health data as well as for illicit use and disclosure of health information.
- (6) regulates authorisations for health information collection, use and disclosure.
- (7) establishes that violations of this law may also be surveyed under the Privacy Act 1988.
- (8) imposes additional sanctions for violation of the integrity of the e-health system.
- (9) specifies the procedure for imposing sanctions.
- (10) governs the general aspects, such as the review of decisions, annual reports, rules of the e-health system, etc.

Organisations seeking to join the national e-health record system have to comply with the technical specifications and requirements set out in the rules of PCEHR 2012.

The Australian PCEHR legislation system also sets forth the rules on parties allowed to access, read and modify the e-health information. Among others, there are provisions regarding the rights of patients to access their own e-health records. According to the legal framework, patients can also trace who searched for their specific e-health information.[105]

Patients can set their privacy settings to suit their individual needs. Only physicians or other designated medical personnel are permitted to make medical inscriptions into patient medical files of the e-health record.

PCEHR legislation in Australia establishes an "opt-in" system.

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[105] Sweeney, S. Australia passes new e-Health law. Asia Pacific Futurego, 2012-06-28 [accessed 03-12-2014]. <http://www.futuregov.asia/articles/2012/jun/27/australia-passes-new-e-health-law/>.

It should be mentioned that the national e-health authority in Australia – HENTA – has been appointed as the managing body of the Australian PCEHR programme. This authority operates on behalf of Health Department.

1.2.14. Legal regulations on e-health in Canada

As stated, there are three ways at present in Canada, which serve for the regulation of electronic health records[106]:

1) The electronic health record is governed by specific legislation;
2) The electronic health record is governed by a special personal data protection regulation, adopted for healthcare;
3) The electronic health record is not specifically regulated by legislation.

However, it is more related to the legal regulation in individual areas. Meanwhile, Canada also has a generally applicable piece of legislation.

In 2008, Canada passed the Personal Health Information Act (eHealth (Personal Health Information Access and Protection of Privacy) Act).[107] The Act establishes the rules for management, collection, use and disclosure of personal health information as well as the right for individuals to have access to their personal health information and the right to request the information to be corrected (if necessary).

The Act also regulates in detail how and by whom health information may be collected; how health information may be used within an organisation; how health information should be protected in a particular organisation; to whom health information may be disclosed and under what circumstances; how individuals can access their health information; how individual complaints about health information management are dealt with and what the procedure for appeals is. The Act also intro-

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[106] Goodman, P. Electronic health records regulation in Canada: what the patients experience reveals about the pursuit of legislative harmonization. Doctoral thesis, University of Western Ontario, 2012. [accessed 03-12-2014]. http://ir.lib.uwo.ca/cgi/viewcontent.cgi?article=2055&context=etd, p. 30.

[107] e-Health (Personal Health Information Access and Protection of Privacy) Act SBC/2008 [accessed 03-12-2014]. <http://www.bclaws.ca/Recon/document/ID/freeside/00_08038_01>, chapter 3.

duces the institute that allows individuals to find out who viewed their health data.[108]

While regulating the collection of personal information, the Canadian eHealth Act does not use the word “consent”. In general, “consent” is mentioned in the text six times. Four times as the reference to consent of an individual to disclose personal information in certain circumstances (e. g., planning or examination); and the other two times, the word “consent” is part of a blanket rule concerning the healthcare law or the law on the health infrastructure. Consequently, the eHealth Act does not require the consent of an individual for collection of personal data about health.[109]

However, the Act does not define the electronic health record, although it was passed specifically to regulate this institution.[110] Instead, this Act mentions health information banks. According to the Act, banks on health information are databases, managed as per objectives, highlighted in Section 4 of the Act and are controlled by a healthcare institution.[111]

In Canada, there is a federally-funded, independent, non-profit institution *Infoway*, which is responsible for ongoing e-health projects in the country. The Government of Canada provides respective financing through this organisation and defines national e-health priorities.[112]

1.2.15. Legal regulations on e-health in the United States of America (USA)

Differently than European countries, the United States of America mostly focused on the development of electronic health records, deployed by the private sector, with a higher emphasis on patients than providers of

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[108] New Legislation to Protect Personal Health Information [accessed 03-12-2014]. <http://www.releases.gov.nl. ca/releases/2008/health/0520n03.htm>.

[109] Goodman, P. Electronic health records regulation in Canada: what the patients experience reveals about the pursuit of legislative harmonization. Doctoral thesis, University of Western Ontario, 2012. [accessed 12-12-2014]. <http://ir.lib.uwo.ca/cgi/viewcontent.cgi?article=2055&context=etd>; p. 69.

[110] *Ibid.*, p. 67.

[111] e-Health (Personal Health Information Access and Protection of Privacy) Act SBC/2008 [accessed 03-12-2014]. <http://www.bclaws.ca/Recon/document/ID/freeside/00_08038_01>, clause 38.

[112] Canada Health Infoway [accessed 03-12-2014]. < http://www.health.gov.bc.ca/ehealth/infoway.html>.

healthcare services.[113] In February 2009, the US Congress passed a landmark legal regulation, creating the foundation for electronic health records. This legal regulation is known as ARRA (American Recovery and Reinvestment Act).[114] Under the Act, the promotion of the use of e-health systems has been supported with USD 19 billion. Entities, having implemented electronic health record systems, are entitled to certain benefits.

The ARRA is a legal act for funding and does not regulate the e-health system as such. However, this legislation necessitates the urged establishment of the following institutions/structures:

- Health Information Technology Policy Committee (HIT Policy Committee), which issues recommendations to the National Coordinator regarding the National Health Information Infrastructure.
- Health IT Standards Committee, which issues recommendations to the National Coordinator regarding e-health standards.
- National Health Statistics Committee.

It is important to mention the Office of the National Coordinator for Health Information Technology.[115] It is a federal structure, responsible for the efforts to implement information technologies in the area of health as well as for the electronic exchange of health information. This structure was created in 2004; it was established by the very ARRA, which is also known as the Health Information Technology for Economic and Clinical Health (HITECH) Act.[116]

It should be noted that, differently from the EU, the development of the US e-health systems is much less coordinated at the Governmental level as the entire process is entrusted to the industry and developers of e-health systems.[117]

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[113] George C., Whitehouse D., Duquenoy P. eHealth: Legal, Ethical and Governance Challenges. Berlin, Springer-Verlag, 2013, p. 51.

[114] *Ibid.*, p. 42.

[115] The Office of the National Coordinator for Health Information Technology (ONC) [accessed 03-12-2014]. <http://www.healthit.gov/newsroom/about-onc>.

[116] Index for Excerpts from the American Recovery and Reinvestment Act of 2009 (ARRA) [accessed 03-12-2014]. <http://www.healthit.gov/sites/default/files/hitech_act_excerpt_from_arra_with_index.pdf>.

[117] Dumortier, J., Verhenneman, G. Legal Regulations on Electronic Health Records: A Prerequisite or an Unavoidable By-Product? - The Legal Aspects of Electronic Health Records in Europe and the US Analysed. ICRI Research Paper, 2011 (5) [accessed 03-12-2014]. <http://papers.ssrn.com/sol3/papers.cfm?abstract_id =1975758>.

It should also be stated that the US legal framework is not focused on the regulation of the content of electronic medical records, but rather on the standardisation in the area of e-health. HIPAA standards could serve as an example. The USA traditionally uses slightly different regulatory instruments than Europe; it is standardisation, guidelines and self-regulation. The domain of e-health is no exception.[118]

The concept of a patient's information confidentiality is fundamental to medical practice. However, the patient's right to privacy stems from several sources. Firstly, the case law of the US Supreme Court, which recognises the constitutional right to privacy (e.g., *the case Griswold v. Connecticut*). In addition, privacy in the area of medicine is protected by federal and state laws.[119]

In summary, the processes of legislative regulation in the area of e-health develop rapidly in non-EU countries as well. It should be noted that introduction of the legal regulation starts from the fundamental rules of law and later extends to statutory instruments. Nevertheless, the regulatory practices in the area of e-health in non-EU countries significantly differ from each other as well as from those applied in the European Union Member States (different regulatory instruments, etc.).

1.3. Analysis of Lithuanian legal provisions on e-heath

1.3.1. Strategic legal regulation of e-health in Lithuania

1.3.1.1. Lithuanian eHealth System Development Strategy for the period 2007–2015

The National eHealth System Development Strategy for the period 2007–2015[120] is valid in Lithuanian in the period 2007 to 2015 (the Strategy). The title of the Strategy itself indicates that the document is exclusively

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[118] George C., Whitehouse D., Duquenoy P. eHealth: Legal, Ethical and Governance Challenges. Berlin, Springer-Verlag, 2013, p. 35.

[119] Grady, A. Electronic heatlh records: how the united states can leanr from french dossier medical personel. Wisconsin International Law Journal. 2012 (2) 30 [accessed 04-12-2014]. <http://hosted.law.wisc.edu/wordpress/wilj/files/2013/01/Grady.pdf>, p. 15.

[120] Order of Health minister of the Republic of Lithuania on Lithuanian 2007–2015 e. health development strategy approval of 9 october 2007. Official gazette, 2007, No. 108-4430.

associated with e-health. The purpose of this strategy is "*to achieve the balance between existing and newly appearing information and communication technologies, national and global tendencies, healthcare needs in immediate and further future, in order to guarantee evolutionary development of Lithuania's e-health system, by consistently improving the quality of healthcare services at every stage of the Strategy's implementation*."[121]

The Strategy uses a number of concepts related to the e-health system:

- e-health;
- electronic health record.

eHealth is the aggregate of healthcare, medical informatics and administration ensured while deploying information and communication technologies, organisational innovation and new skills and intended for the improvement of health (personal, public, pharmaceutical) services through a prompt provision of detailed information required for activities.[122]

Electronic health record (EHR) is electronically collected data on previous and current physical and mental health of a patient that ensure easy access to this data in the process of provision of healthcare services and for other closely related purposes. Patient-centred EHR is the basis of the e-health system based on the principle of "one resident – one history" (OROH). For the purpose of prophylaxis and prevention, EHR includes lifetime personal health data.[123]

The Strategy clearly establishes two main <u>objectives</u>:

- "*to design and maintain an evolving, balanced, safe and reliable information infrastructure of e-health services;*
- *to design and develop e-Health services for residents, patients, practitionersand institutions*."[124]

The Strategy is implemented in the following main areas:

Firstly, it aims to design and develop the basis of the e-health system, i.e. the electronic health record (EHR).

The Strategy states that "*electronic health record of a patient encompasses patient's health information and practically materialises the fundamental*

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[121] *Ibid.*, part 2.

[122] *Ibid.*, part 3.

[123] *Ibid.*, part 3.

[124] *Ibid.*, part 31.

concept, which is the focus of the architecture of the e-health system on the patient and his or her needs to ensure continuity and quality of healthcare services. EHR is the focal point of the national e-health systems. The degree of its use shows the national progress in this area as the implementation of EHR requires unanimous patient identification, information integration and exchange, ensured security and other features that collectively comprise the e-health system".[125]

According to the Strategy, "*the basis of EHR is data sharing and information security. A considerable attention is given to data sharing because the functioning of EHR and the entire e-health system depends on it. The shift from local information systems is made to the national e-health systems, which ensure the integration of local information systems to enable virtual communication of all healthcare institutions, professionals and administrators. Authorisation, authentication and certification tools, which are carefully tested, are being created to address the issues related to the increase of the scope of patient information contained in computer files and the information security challenge. The data used for the analysis are depersonalised, i.e. clinical and statistical data are separated from personal data*".[126]

Data sharing, first of all, requires an agreement on common standards and minimum data sets. "*The rapid development of e-health systems boosts the relevance of the standardisation problem and increases the risk of 'miscommunication' (incompatibility) between the systems. This problem must be addressed on three levels of interoperability: semantic (terminology, concepts, information models, archetypes, ontology), data (records, documents) and technology (databases, protocols, etc.). For this purpose, data sharing standards are being designed and implemented, tools for the integration of data contained in individual information systems and systems, which are being developed within the framework of international agreements, are being developed, standardised required minimum data sets for each European citizen are being discussed*".[127]

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[125] *Ibid.*, part 32.1.

[126] *Ibid.*, part 32.1.

[127] *Ibid.*, part 32.1.

It should be noted that this monograph has a separate chapter addressing the issue of the electronic health record to examine the concept of the electronic health record, also the protection of personal data and other aspects.

The second area of implementation of the Strategy is to design and deploy the essential e-health system applications through the maximum use of its advantages.

The main perspective of the use of the e-health system is "*the design and use of decision support systems. This is one of the most promising e-health development trends. Information collected in the e-health system is processed in order to obtain knowledge required to make clinical and administrative decisions (for the prevention, diagnosis, prescription of medication, treatment methods and tactics) as well as to make decisions on a patient level (for the selection of services, order of services). The latest trend is switching from general recommendations, rules, and reminders to the custom concept of decision support, where a physician is offered a decision in respect of certain patient based on processing the detailed information contained in large databases. The number of medical errors can be reduced by approx. 20–30 per cent through the use of e-health technologies, including systems of clinical decision support*".[128]

The following objectives[129] are set to achieve the Strategy's aims in accordance with the main directions of the development:

1. Design, maintenance and development of the national e-health information system (NESS);
2. Design and development of services for the population and patients;
3. Design, deployment, maintenance and development of information systems for healthcare institutions (design of components (subsystems) of the national e-health system);
4. Assurance of data quality and reliability:
5. Deployment of tools for clinical decision support;

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[128] *Ibid.*, part 32.2.

[129] *Ibid.*, part 31.

6. Deployment of tools for management of medical images and telemedicine;
7. Deployment of reports for control, statistics and payment and analysis tools;
8. Raising public awareness regarding the possibilities opened by the e-health system and user training.

Thus, the Strategy presents a detailed description of the objectives, directions and tasks related to the e-health system. The strategy implies the selection of the Estonian model for the implementation of the e-health system and the electronic health record. The goals, directions and tasks of the Strategy spell out the maximum possible number of issues that need to be dealt with in the development process of the e-health system of Lithuania. However, the Strategy is only valid for the period 2007–2015.

1.3.1.2. Programme on the Development of eHealth System of the Republic of Lithuania for 2009–2015

The Programme for the Development of eHealth System of the Republic of Lithuania for 2009–2015 matures in 2015.[130] The title of the Programme itself indicates that the Programme is exclusively associated with e-health. The Programme is prepared "*to implement Lithuanian Health Programme approved by the Resolution of Seimas of the Republic of Lithuania No. VIII-833 of 3 July 1998 (Official Gazette, 1998, No. 64-1842), Lithuanian eHealth Strategy for 2007–2015 approved by the Order of the Ministry of Health of the Republic of Lithuania No. V-811 of 9 October 2007 (Official Gazette, 2007, No. 108-4430)*" [131] and a number of European documents.

This Programme is prepared "*to achieve the balance between existing and newly appearing information and communication technologies, national and global tendencies, healthcare needs in immediate and further future, in order to guarantee evolutionary development of Lithuania's e-health system, by consistently improving the quality of healthcare services*".[132]

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[130] Order of Health minister of the Republic of Lithuania on e.health system 2009-2015 development programme approval No. V-151 of 22 February 2010. Official gazette, 2010 , No. 23-1079.

[131] *Ibid.*, part 1.

[132] *Ibid.*, part 2.

The Programme uses a number of concepts related to the e-health system:

- e-health;
- electronic health record;
- electronic medical record;
- information system for the e-health services and cooperation infrastructure;
- Council of eHealth Coordination.

The Programme states that "e-health is the aggregate of healthcare, medical informatics and administration ensured while deploying information and communication technologies, organisational innovation and new skills and intended for the improvement of health (personal, public, pharmaceutical) services through a prompt provision of detailed information required for operation".[133]

Just as the Strategy, the Programme describes the electronic health record as electronically collected data on previous and current physical and mental health of a patient that ensure easy access to this data in the process of provision of healthcare services and for other closely related purposes. Patient-centred EHR is the fundament of the e-health system based on the OROEHR principle. For the purpose of prophylaxis and prevention, EHR includes lifetime personal health data.[134]

Electronic health record (EHR) is clinical data electronically collected in one healthcare institution on previous and current physical and mental health of a patient.[135]

It should be noted that the e-health concepts used in the Strategy and in the Programme were unified as of 19 February 2010. However, previously different concepts were used. For example, the Strategy used the concept of electronic health records while the Programme spoke about the electronic health history and electronic medical history. Such a discrepancy between the concepts was against the good practice of e-health regulation.

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[133] *Ibid.*, part 3.

[134] *Ibid.*, part 3.

[135] *Ibid.*

The main principles for the implementation of the Programme are as follow[136]:

1. Principles for the implementation of the e-health services and cooperation infrastructure:
    - *solutions that are intended for the general use by the participants of healthcare sector and cooperation between healthcare participants are developed in the environment of the e-health services and cooperation infrastructure;*
    - *a single access to information resources of the healthcare sector: registers, classifiers and terminology, and e-health records (EHR);*
    - *the e-health services and cooperation infrastructure is created based on solutions that allow for the technical and semantic interoperability and compatibility of systems at national and international levels;*
    - *the catalogue of e-health services, which is managed in the environment of the e-health services and cooperation infrastructure, is the " single point of access" to e-health services for the population and professionals;*
    - *a single access to public administration information resources and eGovernment services made available through the implementation of interaction between the e-health services and cooperation infrastructure and the Information System for Interoperability of Public Administration Information Systems (VAIISIS);*
    - *e-health services under implementation, design and development of which are specified in the Programme and funded by the EU Structural Funds and the state budget funds, must be designed based on open standards."*[137]
2. Principles for the implementation of e-health services for the population and patients:
    - *e-health services of the existing and new healthcare institutions and other institutions are connected to a single electronic point of access, i.e. the catalogue of e-health services for the population in the environment of the e-health services and cooperation infra-*

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[136] *Ibid.*, part 35.

[137] *Ibid.*

structure, thus enabling the population and patients to access and easily find e-health services in one place and ensuring the implementation of the OROEHR principle;

- *new inter-institutional e-health services (provided by two or more healthcare establishments and institutions) for the population are deployed by using the components of the e-health services and cooperation infrastructure or by simply deploying such e-health services in the environment of the e-health services and cooperation infrastructure."*[138]

In order to implement the Programme in accordance with (1) the priority aspects and goals of the Lithuanian Health Programme set in respect of (2) resident (patient) and (3) healthcare institution, the following objectives are set for further implementation of the common e-health services and cooperation infrastructure, which is essential for the implementation of the Programme's goals and objectives[139]:

1. To provide a unified and easy access to e-health services for the population;
2. To allow the cooperation between participants of the healthcare sector;
3. To reduce the costs of implementation and operation of e-health solutions, implementation failure and the risk of incompatibility.

1.3.1.3. Implementation Plan for the Programme of the Development of eHealth System of the Republic of Lithuania for 2009–2015

Implementation Plan for the Programme of the Development of eHealth System of the Republic of Lithuania for 2009–2015[140] is approved by the Order No V-570 of the Minister of Health of the Republic of Lithuania of 18 June 2010.

The Plan provides specific measures in accordance with the Programme's objectives, implementation of these measures, the expected re-

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[138] *Ibid.*

[139] *Ibid.*, part 31.

[140] Order of Health minister of the Republic of Lithuania on e.health system 2009-2015 implementation plan approval No. V-570 of 18 June 2010. Official gazette, 2010 , No. 74-3763.

sults and deadlines, as well as responsible persons, and source of funding and the need for funds. For example, the Plan indicates that the project *the Development of the eHealth Services and Cooperation Infrastructure*[141] must be implemented by 2015 and charges the Ministry of Health with the responsibility.

Specific measures are provided according to each objective of the Plan.

In summary, it should be noted that provisions of the Strategy and the Programme overlap. A clearer differentiation between these documents is preferred not only in terms of separate orders of the Minister of Health but also in terms of their content. In addition, both the Strategy and the Programme are prepared for the period until 2015. The design of a new strategy and programme must commence immediately. Preparation of the above draft documents must be done in avoidance of duplication of provisions and by ensuring systematic legal regulation and consideration of the EU strategic documents.

1.3.2. eHealth and fundamentals of legal regulation in Lithuania

1.3.2.1. Law of the Republic of Lithuania on the Health System

The electronic health system is regulated in Section III of the Law of the Republic of Lithuania on the Health System.[142] It has a separate dedicated Chapter 13^1 entitled *Management of Electronic Health System of the Republic of Lithuania*.

First of all, Clause 1 of the Article specifies that implementation of the electronic health system of the Republic of Lithuania shall be coordinated and supervised by the Ministry of Health. Thus, the Law appoints one institution in charge of implementation of the electronic health system.

Article on definitions of this Law explains the electronic health system: "*Electronic health system (e-health system) means the aggregate of tools for health promotion activities through the use of information and communication technologies*".[143]

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[141] To be created e-health portal, etc.

[142] Law on Health System of the Republic of Lithuania No. I-552. Official gazette, 1994, No. 63-1231.

[143] *Ibid.*, art. 2, part 18.

Secondly, according to Clause 2 of Article 13^1, "*the national electronic health services and collaborative infrastructure information system shall be established during the implementation of the tools for the electronic health system of the Republic of Lithuania. This information system shall be managed by the Ministry of Health. The regulations of state electronic health services and collaboration infrastructure information systems shall be approved, and the managers shall be appointed by the Government*".[144] This means that a centralised electronic health model is established on the legislative level, and the Government is entrusted with the definition of detailed conditions of the model.

Thirdly, Clause 3 of this Article stipulates the duty to use the electronic health services system: "*all NHSL [national health system of Lithuania] healthcare activity management and executive bodies, healthcare providers or receiving persons and other persons, must use the national electronic health services and collaboration infrastructure information system and to provide and receive data in accordance with the legislation procedures when carrying out statutory functions or providing healthcare activity-related services*."[145]

Fourthly, Clause 4 of this Article specifies the principles of funding: the national electronic health services and collaboration infrastructure information system shall be funded from the state budget, the European Union Structural Funds as well as other sources of funding defined in the legal acts. It is clear that the Law has laid down no relevant regulations regarding electronic medical record/electronic health history. The key attributes, structure and other important aspects of e-health are not yet stipulated. It still remains among the tasks of the Government. However, it is noteworthy that such reference points shall be regulated *de jure*. This suggests that the provisions of this Law should be supplemented by new aspects which stipulate the fundamental principles and structure of e-health systems and provide the essential element of e-health, which is the concept of electronic health records/electronic health history.[146]

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[144] *Ibid*., art. 13-1, part2.

[145] *Ibid*., art. 13-1.

[146] For more information about EHR, please see section 1.6.

1.3.2.2. Law of the Republic of Lithuania on the Rights of Patients and Compensation for the Damage to Their Health

Law of the Republic of Lithuania on the Rights of Patients and Compensation for the Damage to Their Health,[147] among other instruments, specifies the general patient's rights: right to choose a healthcare institution and a healthcare professional; right to information; right not to know; right of access to entries in one's medical records; right to privacy; right to anonymous healthcare.

It should be noted that the above rights are regulated on the basis of the old health system, where data concerning health were processed in medical records. Article 7 of the Law regulates patient's right of access to entries in one's medical records. Clause 1 of this Article specifies that "*the patient, at his request, must be provided with his medical records*". Clause 5 of this Article specifies that "*at the patient's request, upon presentation of the documents confirming his identity, the healthcare institution must, at the patient's expense, make and issue copies of the patient's medical records approved by the healthcare institution, as well as issue descriptions of the diagnosis and treatment*".[148] It should be noted that neither these provisions nor other rules of law allow for electronic health records, and in general they are not adapted to the electronic health system.

The same legal regulation which fails to meet today's realities is provided in the Law in regards to patient's consent (Chapter III of the Law).

According to foreign regulatory practice, patients' rights are often adapted to electronic health records by means of their regulation in relevant framework legislation. Therefore, this Law requires appropriate amendments.

1.4. eHealth and fundamentals of legal regulation in privacy and legal protection of personal data in Lithuania

In Lithuania, the Data Protection Directive is implemented by the Law of the Republic of Lithuania on Legal Protection of Personal Data.[149] The

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[147] Law of the Republic of Lithuania on the Rights of Patients and Compensation for the Damage to Their Health No. I-1562, Official gazette, 1996, No. 102-2317.

[148] *Ibid*., art. 7, part 5.

[149] Law on Legal Protection of Personal Data of the Republic of Lithuania No. I-1374, Official gazette, 1996; No. 63-1479.

purpose of this Law is the protection of an individual's right to privacy with regard to the processing of personal data. This Law regulates relations arising in the course of the processing of personal data by automatic means, and during the processing of personal data by other than automatic means in filing systems: lists, card indexes, files, codes etc.[150] The Law also applies to data processing for the purpose of health protection.

To implement the Data Protection Directive, this Law lays down similar criteria for lawful processing of personal data and personal data management principles.

According to Article 2(8) of the Law on Legal Protection of Personal Data, *special categories of personal data* are the data as to the racial or ethnic origin of a natural person, his political opinions, religious, philosophical or other beliefs, membership in a trade union, and data concerning his health, sex life and criminal convictions. Thus, personal data on health are attributed to the special category of personal data.

The Law on Legal Protection of Personal Data prohibits the processing of special categories of personal data with the exception of following cases:

"*1) the data subject has given his consent;*

2) such processing is necessary for the purposes of work or public service in the exercise of the rights and obligations of the data controller in the field of labour law in cases provided by law;

3) it is necessary to protect vital interests of the data subject or of any other person, where the data subject is unable to give his consent due to a physical disability or because he is legally incapable;

4) processing is carried out in the course of the activities by a foundation, association or any other non-profit-seeking body for political, philosophical, religious or trade-union aim on condition that the processed data relate solely to the members of the body or to persons who have regular contact with it in connection with its purposes. This category of personal data may not be disclosed to a third party without the consent of the data subject;

5) the data have been made public by the data subject;

6) it is necessary, in cases provided by law, for the prevention and investigation of criminal offences;

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[150] *Ibid.*, art. 1, part 2.

7) *the data are necessary for a court hearing;*
8) *it is a legal obligation of the data controller under the laws to process personal data.*"[151]

However, in regard to personal data on health, the Law separately regulates that "*the data about a person's health may also be processed for the purposes and in the manner specified in Article 10 of this Law and the laws pertaining to healthcare.*"[152]

Article 7 of the Law establishes requirements for the use of personal identification number. According to Clause 2 of the above Article, the use of a personal identification number for the processing of personal data shall be conditional on the consent of the data subject. Clause 3 establishes the cases when personal identification number may be used without the consent of the data subject:

- "*if such a right is stipulated in the laws;*
- *for research or statistical purposes;*
- *in state registers and information systems provided that they have been officially approved under the law;*
- *it is used by legal persons involved in activities related to granting of loans, recovery of debts, insurance or leasing, healthcare and social insurance as well as in the activities of other institutions of social care, educational establishments, research and studies institutions, and when processing classified data in cases provided by law*".[153]

The Law specifies special requirements when personal data are processed for special purposes, including healthcare (Article 10 *Processing of Personal Data for Purposes of Healthcare*):

Clause 1, "*Personal data on the person's health (its state, diagnosis, prognosis, treatment, etc.) may be processed by an authorised healthcare professional. Person's health shall be subject to professional secrecy under the Civil Code, the laws regulating the health-care system or patients' rights and other legal acts.*"

Clause 2, "*Processing of personal data for purposes of medical research shall be governed by this Law and other laws.*"

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[151] *Ibid.*, art. 5, part 2.

[152] *Ibid.*, art. 5, part 3.

[153] *Ibid.*, art. 7.

Clause 3, "*Personal data on the person's health shall be processed by automatic means and in the course of scientific research on condition the State Personal Data Protection Inspectorate is notified. In this case, the State Personal Data Protection Inspectorate must carry out a prior checking.*"

It should be noted that the processing of personal data in e-health systems should follow not only the regulations of this Article but also a number of other provisions of the Law. For example, Article 5 of the Law on Personal Data Protection must be observed in dealing with the issue of personal data processing criterion.

Chapter 11 of this Law regulates responsibility issues. According to Article 53, data controllers, data processors and other persons breaching the Law are subject to liability as per legislation of the Republic of Lithuania. The Code of Administrative Offences of the Republic of Lithuania, Article 214-14 *Illegal Processing of Personal Data* provides liability for offenses related to the illegal processing of personal data in violation of the Law of the Republic of Lithuania on Legal Protection of Personal Data. This violation is subject to a penalty, i.e. a fine of up to LTL 1 000 and repeated violation is subject to a fine of up to LTL 2 000. Violation of data subject's rights as stipulated in the Law of the Republic of Lithuania on Legal Protection of Personal Data is subject to administrative liability pursuant to the Code of Administrative Offences of the Republic of Lithuania, Article 214-16. Failure to comply with legitimate instructions of officials of the State Data Protection Inspectorate is subject to liability pursuant to the Code of Administrative Offences of the Republic of Lithuania, Article 214-17.

The Law specifies various pieces of secondary legislation. A significant proportion of them are resolutions of the Government of the Republic of Lithuania. E. g. the Resolution No 262 of the Government of the Republic of Lithuania of 20 February 2002 *Concerning the reorganisation of the state register of personal data controllers, the approval of the regulations and of the procedure for notification by personal data controllers of automated processing of personal data*. This Resolution sets the procedure for notification by personal data controllers of automated data processing and approves the provisions of the State Register of Personal Data Controllers. Orders of the Director of the State Data Protection Inspectorate also issued to:

- recommend the form of the notification of data processing,
- list requirements for the description of data protection measures, and
- specify pre-screening rules etc.

In addition to binding secondary legislation, the State Data Protection Inspectorate also makes recommendations, which are not binding. All recommendations of the Inspectorate are available on the Inspectorate's website http://www.ada.lt.

To sum up, privacy and personal data protection and e-health in Lithuania are subject to the general regulatory framework appended only with one independent Article 10. It can be stated that basically the general EU Data Protection Directive and the established data protection mode are applied in regard to e-health data processing. Lithuania has no additional mechanism for regulatory framework pertaining to e-health because Article 10 of the Law does not provide any significant additional provisions.

1.5. Summary and suggestions for the improvement of legal regulation on e-health

The EU Member States should consider provisions of the e-health communications and streamline their national laws also to resolve the problems named in the communications.

As Directive 2011/24/EU on Patients' Rights only initiates some of the processes in the area of e-health (development of guidelines etc.), further activities in the regulation of e-health processes in the EU should be linked to the establishment of the principles of regional e-health system operation and to the ensuring of practical operation of such system as of the date specified.

The EU should adopt data protection regulation, which should be considered as an example of progressive legal regulation and, hopefully, would contribute to better protection of patients' right to privacy and ensure personal data protection within the context of processing of health data.

It is suggested to commence with the preparation of new Lithuanian e-health strategy and the programme immediately. Drafting of the above documents must avoid duplication of provisions and ensure systematic legal regulation and consideration of the EU strategic documents.

Lithuania should adopt new framework laws to stipulate the principles and structure of e-health systems and provide the essential element of e-health, which is the concept of electronic health records. It is also advisable to adjust the regulations of the Law of the Republic of Lithuania on the Rights of Patients and Compensation for the Damage to Their Health in order to ensure they are in compliance with today's realities (for the processing of health data by electronic means).

1.6. Case study: eHealth record and legislative regulations

One of the most important institutions of e-health – rendering of health services in the electronic space – needs to be examined separately. An electronic health record[154] – is an evolving concept defined as a collection of electronic health information on individual patients or a certain group of people.[155]

The arising models of the electronic health records pose a number of challenges for healthcare systems, doctors and legislators. Challenges for the legislative system are among the largest, because a necessity arises for legislators to amend or supplement the traditional current legislative health regulation, giving the right to manage electronic health records, to write electronic prescriptions, etc. The electronic health record is considered as the basic component of e-health upon which the functioning of national e-health depends on. Therefore, the legislative environment of the electronic health record is one of the most important institutions of healthcare converging to the electronic environment. In Lithuania, these processes are only starting; thus, it is important for Lithuania to evaluate the current legislative, regulatory situation and, if necessary, to adopt the good practice of legislative regulation of electronic health records from the EU and the relevant EU countries that are leaders in the field and have significant experience.

A number of scientific publications on electronic health records have appeared abroad in recent years. The issue has been researched by the fol-

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[154] The concept EHR should be treated as synonym of Electronic health history.

[155] Gunter, T. D., Terry, N. P. The Emergence of National Electronic Health Record Architectures in the United States and Australia: Models, Costs, and Questions. Journal of Medical Internet Research. 2005, 7(1).

lowing foreign scientists: Gunter, Terry, Kierkegaard, Sitti, Singh and others. Legislative aspects of electronic health records were analysed in some articles of these scholars. However, the investigations were fragmentary and lacked systematisation and generalisations. Meanwhile, the electronic health record as an institution has not been investigated by Lithuanian researchers. Legislative aspects of the electronic health record have not been researched either.

Objectives of the research

1. To investigate legislative regulation of the electronic health record with regard to the strategic and basic legislation;
2. To analyse legislative regulation of the electronic health record in the field of privacy protection.

Methods

Several different methods have been applied to perform an investigation: while investigating the legislative regulation and the relevant legislative norms of the electronic health record, the author used a comparison method. The empirical method of analysis of legislative documents has been applied to determine the legislative regulation of the valid electronic health record. This method allows to identify accurately and to describe the valid legislative regulation of a respective relationship. While using the recourses of scientific literature, a deduction method has been applied, which allows to draw sufficiently reliable conclusions. The newest scientific literature has been invoked for the study of concepts.

Results of the research

The study revealed that electronic health record is regulated in strategic e-health documents of both the EU and foreign countries. In Lithuania, this practice also exists: a lot of attention is given to the electronic health record in strategic Lithuanian documents on e-health thus creating a basis for further legislative regulation by fundamental and other norms.

Three different models of electronic health record are applied in Europe. In the examined laws of the selected foreign countries, the electronic health record is validated as a separate institution regardless of the selected model.

One article, establishing some fundamental basis of the e-health system, is dedicated to the e-health system in fundamental Lithuanian legislative rules. In Lithuania, the model of the centralised e-health system, which is also called a Scandinavian model, has been selected. However, the electronic health record is not specially regulated in fundamental Lithuanian rules of law.

Legislation of the Republic of Lithuania (to comply with the EU Data Protection Directive 95/46/EC) ensures adequate legislative environment with regard to the legislative protection of privacy in the case of electronic health record. However, the legislative rules on the identification of electronic data systems are only consolidated in statutory instruments.

The EU Data Protection Directive provides for a ban on the processing of personal data concerning health. However, introduction and use of electronic health record systems could be treated as an important public interest (an exception provided in the Data Protection Directive).

In addition to examined legislative problems of the electronic medical record, the following issues of legislative regulation are relevant as well: security of electronic health records (data breaches, information about data breaches, different security levels), retention of electronic health records, e-rights of patients to electronic health records, sending of electronic medical records to other countries, receiving of electronic health records from other countries.

1.6.1. Electronic health record and strategic e-health regulation

Kierkegaard states that in addition to the concept of electronic health record, the concept of the electronic medical record is often used as an alternative. However, these terms are different in principle and should not be confused. The electronic medical record usually stores patient information by relevant medical care institutions, while the electronic health record contains information about the patient from all healthcare institutions.[156] Hereinafter, the position of Kierkegaard regarding the separation of electronic health records and electronic medical records will be used.

However is an electronic health record defined? In the European Commission Recommendation on cross-border compatibility of electronic

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[156] Kierkegaard, P. Electronic health record: wiring Europe`s healthcare. Computer law & security review. 2011 (27). [accessed 28-11-2013]. <http://www.sciencedirect.com/science/article/pii/S0267364911001257>, p. 503.

health record systems approved in 2008, an "electronic health record" is defined as a comprehensive medical record or similar documentation of the past and present physical and mental state of health of an individual in electronic form, and providing for ready availability of these data for medical treatment and other closely related purposes.[157] Identically, the electronic health record is defined by the Article 29 Data Protection Working Party.[158]

In the scientific literature, Gunter and Terry define an electronic health record as the collection of electronic health information about individual patients or a certain group of people.[159]

In various other sources, definitions of the electronic health record differ, but their essence remains the same – collected and stored electronic information about the patient and his health, electronically available for both healthcare professionals and the patient in accordance with the procedure.

In recent years, one of the most important issues of legislative regulation, related to the electronic health record, is that traditional health-related legislative regulation did not provide for the institution of electronic health record. Historically it has been regulated that healthcare services are provided in traditional ways, and patient information is stored by the relevant medical institution in the form of traditional paper documents. Such legislative regulation has long been applied in both Europe and the US.[160] Meanwhile, the electronic health record changes mechanisms of the collection and storage of the information about the patient and his health in principle; therefore, a single electronic information storage format originates, which potentially should be uniform not only in the relevant country but also throughout the European Union.

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[157] Commission Recommendation of 2 July 2008 on crossborder interoperability of electronic health record systems [accessed 05-12-2014]. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri =OJ:L:2008:190: 0037: 0043:EN:PDF >, clause 3 c).

[158] Working document on the processing of personal data relating to health in electronic health records (EHR). WP 131, 2007 [accessed 05-12-2014]. <http://ec.europa.eu/justice/policies/privacy/docs/wpdocs/2007/wp131 _en.pdf>, p. 4.

[159] Gunter, T. D., Terry, N. P. The Emergence of National Electronic Health Record Architectures in the United States and Australia: Models, Costs, and Questions. Journal of Medical Internet Research. 2005, 7(1), p. 1.

[160] Dumortier, J.; Verhenneman, G. Legal regulations of electronic health record: a prerequisite or an unavoidable by-product? – The legal aspects of electronic health records in Europe and the US analysed. ICRI Research Paper , 2011 (5). [accessed 04-12-2014]. <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1975758>, p. 3.

Thus, with the emergence of electronic health records, the traditional legislative regulation of health is facing a challenge and new opportunities at the same time.

Among of the main legislative regulation documents of the relevant area are strategies. These are the cornerstone of the legislation on the basis of which a statutory legislative framework is developed in the field concerned. In the domain of e-health, strategic documents – strategies – are also very important.[161]

In particular, the institution of the EU electronic health record has emerged in strategic documents. These documents gave an impetus to the legislative, regulatory initiatives of electronic health record at the national level.

Directive 2011/24/EU on the application of patients' rights in cross-border healthcare, as Kierkegaard states, sets a model of legislative regulation of e-health for the first time in the history of Europe, thus promoting the development and approval of electronic patient records across the continent.[162] Although, it should be noted that the electronic health records are not mentioned in the Directive directly – the directive calls for the interoperability of e-health systems and services, "work towards delivering sustainable economic and social benefits of European eHealth systems and services and interoperable applications, with a view to achieving a high level of trust and security, enhancing continuity of care and ensuring access to safe and high-quality healthcare."[163]

On 6 December 2012, the European Commission approved the Communication on e-health action plan 2012–2020 – Innovative healthcare in the 21st century.[164] Although electronic health records are not mentioned directly in the Communication, it states that "Bringing down legal barriers

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[161] Štitilis D. E.health record and legal environment: present situation and problems. Health politics and management. 2014, No 1(6); p. 66.

[162] Kierkegaard, P., *supra* note 2, p. 505.

[163] Directive 2011/24/EU of the European parliament and of the Council of 9 March 2011 on the application of patients` rights in cross border healthcare. Brussels, 2011 [accessed 04-12-2014]. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:088:0045:0065:en:PDF>, art. 14, part 2 d. a).

[164] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions „eHealth Action Plan 2012-2020 – Innovative healthcrefor the 21st century". Brussels, 6.12.2012, COM(2012) 736 final. [accessed 05-12-2014]. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2012:0736:FIN:LT:PDF>.

is vital for deploying e-health in Europe. The Directive on the application of patients' rights in cross-border healthcare will contribute to achieving such an objective as it clarifies patients' rights to receive cross-border healthcare, including remotely via telemedicine."[165]

It should also be noted that 2008 saw the approval of the European Commission Recommendation on compatibility[166] of cross-border electronic health record systems, which provides the steps to be taken by the Member States to establish electronic health record systems compatible throughout the European Union. The aim of these recommendations is to provide compatibility with the entire EU e-health systems before the end of 2015.[167] The Recommendation promotes the adoption of relevant legislation, regulating electronic health records compatible in all Member States. While adopting such legislation, it is worth paying attention to personal data relating to health, sensitivity and ensuring appropriate safeguards in relation to the protection of one of the fundamental human rights – the right to privacy.[168]

In some European countries, the "validation" and regulation of an electronic health record was encouraged by national governments,[169] the electronic health record has started to emerge in strategic documents as well.

From 2004, Ireland's National Health Information Strategy[170] dedicated a separate chapter for the electronic health record. The Strategy deals with the concept of electronic health record and the conceptual assumptions of electronic health record. The Strategy states that in view of the interoperability of electronic health record, a national, coordinated and integrated approach is required. Information systems of individual healthcare institutions must be modified taking into account the national aspect.[171]

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[165] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions „eHealth Action Plan 2012-2020 – Innovative healthcrefor the 21st century". Brussels, 6.12.2012, COM(2012) 736 final, *supra* note 9, p. 9.

[166] Commission Recommendation of 2 July 2008 on crossborder interoperability of electronic health record systems, *supra* note 3.

[167] *Ibid.*, preamble p. 9.

[168] Kierkegaard, P., *supra* note 1, p. 506.

[169] Dumortier, J.; Verhenneman, G., *supra* note 1, p. 2.

[170] Health Information: a National Strategy. Ireland, 2004. [accessed 04-12-2014]. <http://www.dohc.ie/publications/pdf/nhis.pdf?direct=1>.

[171] *Ibid.*, p. 58.

In the Estonian National Health Plan,[172] the electronic health record is not regulated in as much detail as in Ireland's case; nevertheless, the plan suggests that Estonia supports innovative solutions in medicine. It is indicated that the National eHealth Information System will be deployed in Estonia, namely, digital patient history, digital records and digital prescriptions.[173]

Since 1990, Denmark has been using the national IT strategy in order to direct the country towards the transformation processes, using IT in providing high-quality healthcare services. The best example of this is that the Danish Government has established the mandatory use of electronic health records.[174]

The presented examples relating to the national health strategies, as demonstrated by the study of healthcare strategies of foreign countries, show that both the EU and other foreign countries focuses on electronic health records in strategic documents as well. Although this practice does not include all countries without exception, regulation of electronic health records in strategy documents is qualified as a desirable example, initiating consolidation of the appropriate legislative regulation, related to electronic health records, in other national legislation as well, by regulating specific aspects related to the electronic health record (legal power, protection of privacy security, access, identification etc.).

Lithuania belongs to those countries that mention the electronic health record in their strategic documents. As already mentioned above, in the Lithuanian eHealth Development Strategy 2007–2015,[175] the electronic health record has been listed among the concepts. In the Strategy, the electronic health record is referred to as an "electronic health history" and is defined as data about the patient's past and present physical and mental state of health collected in electronic form, ensuring easy access to this data in

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[172] National Health Plan. Estonia [accessed 04-12-2014]. <http://www.emcdda.europa.eu/attachements.cfm/att_ 229581_EN_EE_Rahvastiku_tervise_arengukava_2009-2020.pdf >.

[173] *Ibid.*, p. 6.

[174] Kierkegaard, P. eHealth in Denmark: A Case Study. Journal of Medical Systems. 2013, October. [accessed 04-12-2014]. <http://download.springer.com.skaitykla.mruni.eu/static/pdf/56/art%253A10.1007%252Fs10916-013-9991-y.pdf?auth66=1385807911_a0f9c2f3f540a719a82390f3871c7440&ext=.pdf>, p. 5.

[175] Order of Health minister of the Republic of Lithuania on Lithuanian 2007-2015 e.health development strategy approval of 9 October 2007. Official gazette, 2007, No. 108-4430.

the process of provision of healthcare services and for other closely related purposes. A patient-centred ESI [electronic health record] is a framework of e-health system and is based on the principle of "one resident – one history" (OROH).[176] The document provides one of the main directions of the implementation of the Strategy – to design and develop the framework of the e-health system – the electronic health record.

The Lithuanian Programme on the Development of eHealth System for 2009–2015,[177] also gives a lot of attention to the electronic health record. This record is referred to as an electronic health history in the Programme. In the Programme, the electronic health history is defined as a data about the patient's past and present physical and mental state of health collected in electronic form, ensuring easy access to this data in the process of provision of healthcare services and for other closely related purposes.[178] In addition to electronic health history, the Programme mentions an electronic medical history, which is understood as a medical data electronically collected in one of healthcare institutions.

The declared aim of this Programme is to introduce e-health services, which include validation and installation of electronic health record as well. The provision of the Programme should be noted, according to which "e-health services and cooperation infrastructure must be built on solutions that allow for the technical and semantic interoperability and compatibility of systems at national and international levels".[179]

Consequently, one of the provisions of the strategic documents in the domain of health is regarding electronic health records. This practice, which is widespread in strategic documents of both EU and foreign countries, also exists in Lithuania. Lithuanian e-health strategy documents give a lot of attention to the electronic health record thus creating a basis for further legislative regulation of the fundamental and other norms.

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[176] *Ibid.*, part 3, p. 2.

[177] Order of Health minister of the Republic of Lithuania on e.health system 2009–2015 development programme approval No. V-151 of 22 February 2010. Official gazette, 2010 , No. 23-1079.

[178] *Ibid.*, 3 p. 2 pp.

[179] Order of Health minister of the Republic of Lithuania on e.health system 2009-2015 development programme approval No. V-151 of 22 February 2010. Official gazette, 2010 , No. 23-1079; part 35.1.3

1.6.2. Problem-related to legal power of the electronic health record

Sittig and Singh say that among the most pressing issues of electronic health records are legislative problems.[180] According to the authors, the issue of the legal power of the e-health is among the most relevant legal problems. An analogy with an electronic signature can be used. Just as an electronic signature that was validated in the legislative systems which had not recognised technologies, the electronic health record should also be consolidated into the legislative systems. Electronic signature in the legislation of many countries has been consolidated at the level of the fundamental legislative norms, i.e. laws. Lithuania is no exception: in 2000, the Republic of Lithuania adopted the Law on Electronic Signature. Meanwhile, in one of the most important norms of the law – the one related to the legal power of electronic signature in the broad sense – in the note of the Draft Law on Electronic Signature of the Republic of Lithuania, it is stated that *"the central part of the draft is Article 8 Legal power of Electronic Signature"*.[181] It is important to note that this monograph doesn't sustain the position that the legal power of the electronic health record should be consolidated in a separate law (as in case of the electronic signature); in the context of this study, the very fact of the legal power consolidation in fundamental legislative regulations is important.

How issues of legal power of the electronic health record are solved in foreign countries? It should be noted that three different models of electronic health records are applied in Europe[182]:

- Centralised electronic health registers, where a central register is established. This model is referred to as the Scandinavian model. It has been chosen for implementation in as well.
- The decentralised model of electronic health records, where health data are further processed separately by each healthcare service provider, but the system is connected to the national exchange point.

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[180] Sittig D. F., Singh, H. Legal, Ethical, and Financial Dilemmas in Electronic Health Record Adoption and Use. Pediatrics, 2011, 127(4). [accessed 05-12-2014]. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3065078/>, p. 1.

[181] Explanatory note of law on electronic signature of the Republic of Lithuania. [accessed 25-12-2014]. <http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=101575>.

[182] Dumortier, J.; Verhenneman, G., *supra* note 6, p. 10–13.

Through this exchange point, a healthcare service provider can access other health records.

- French model *Dossier Médical Personnel*, where the patient chooses a healthcare service provider in order to manage his personal health record.

One of the most advanced countries in the legislative regulation of e-health is Estonia. As already mentioned, Estonia chose the centralised electronic medical record model. On 20 December 2007, the Estonian Parliament adopted the law amending the Health Services Organisation Act.[183] This law provides the legal framework for developing e-health projects, such as the Electronic Health Record, Digital Image and Digital Registration. The new law aims to unify information systems into one centralised health information system. The main idea of this law is to enable the processing of various medical documents in electronic form. The law stipulates that healthcare service providers are required to provide data to the electronic health card. Provision of such data is compulsory by law.[184]

Another foreign country with extensive e-health regulatory experience is Germany. Already in 2003, the amendment of German Public Health Insurance Law provided for the fundamental norms to modernise the processing of information in the German healthcare system. The decision was made to set up a designated infrastructure for health telematics in Germany. Although Germany chose a decentralised model, one of the key provisions of the legislation is related to the electronic health card. Electronic Health Card is regulated in the Social Code at the federal level. In accordance with Law, the card is a tool to manage personal medical data. Relevant data on the card can be handled mandatorily or optionally. The Law defines the rights of individuals with the purpose to protect private personal data. The rights of citizens and data privacy are legally enforceable through the consent of a citizen (it must be documented in the electronic health card). This consent specifies who may and who may not have access to patient data, as well as the information about the pro-

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[183] Estonian Health Services Organisation Act [accessed 05-12-2014]. <https://www.riigiteataja.ee/en/eli/ee/ 512122013005/consolide>.

[184] Dumortier, J.; Verhenneman, G., *supra* note 6, p. 12.

tection of access information (information on at least 50 logins must be retained).[185]

In Ireland, the domain of e-health should be governed by the Health Information Bill. The need for this piece of legislation emerged in the National Health Strategy of 2001 and the National Health Information Strategy of 2004. The key objectives stated in the Draft Bill are as follow:

- To define legislation that will enable the use of information for improving healthcare and patient safety;
- To promote the use of information technologies, aiming at improvement of services provided to patients;
- To set an effective information management structure for the health system as such.

This Bill will also define the rights of patients to access information in electronic health records.

This Law also regulates the lifelong identifier of a patient, which identifies a citizen for health purposes, regardless of the fact whether the citizen is insured or not. Under the Law, persons are identified by a single identifier in any e-health record system.[186]

The laws of many foreign countries have been amended, with the aim to adapt the processing of health data in electronic form.[187] Denmark could be mentioned as an example, where such changes were made in 2007. Revisions were introduced to the Health Act, which historically established that health data were managed in paper form rather than electronically. The new Article 42a was introduced to govern the processing of electronic medical data as well as confidentiality and access rights.

Thus, the electronic health record has been established as a separate institution in the laws of investigated foreign countries. In addition, the trend has been noticed to regulate the electronic health record with the help of fundamental norms of law.

The regulatory situation in Lithuania needs to be closely examined. One of the framework laws is the Law of the Republic of Lithuania on the Health

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[185] Country Brief Germany. eHealth Strategies Report. October, 2010 [accessed 02-12-2014]. <http://ehealth-strategies.eu/database/germany.html>.

[186] Country Brief Ireland. eHealth Strategies Report. October, 2010, *supra* note 29.

[187] *Ibid.*, p. 15.

System[188], in which the electronic health system is regulated in Chapter III. A separate Article 13^1 is dedicated to the *Management of e-health system of the Republic of Lithuania*.

First of all, the first paragraph provides that the Ministry of Health co-ordinates and supervises the implementation of the e-health system of the Republic of Lithuania. Thus, one responsible authority is designated for the implementation of the e-health system by the Law.

It should be clarified, what is regarded as an e-health system: "*Electronic health system (e-health system) means the aggregate of tools for health promotion activities through the use of information and communication technologies*".[189]

Secondly, according to the second part of the mentioned Article, "*the national electronic health services and collaborative infrastructure information system shall be established during the implementation of the tools for electronic health system of the Republic of Lithuania. This information system shall be managed by the Ministry of Health. The regulations of state electronic health services and collaboration infrastructure information systems shall be approved, and the managers shall be appointed by the Government*". [190]This means that a centralised electronic health model is established is established by the law, and the Government is entrusted with the definition of detailed conditions of the model.

Thirdly, the third paragraph of Article establishes the duty to use the electronic health services system: "*all NHSL [national health system of Lithuania] healthcare activity management and executive bodies, healthcare providers or receiving persons and other persons, must use the national electronic health services and collaboration infrastructure information system and to provide and receive data in accordance with the legislation procedures when carrying out statutory functions or providing healthcare activity-related services*".[191]

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188 Law on Health System of the Republic of Lithuania No. I-552. *Official gazette*, 1994, No. 63-1231.

189 Law on Health System of the Republic of Lithuania No. I-552. *Official gazette*, 1994, No. 63-1231, art. 2, part 18.

190 Law on Health System of the Republic of Lithuania No. I-552. *Official gazette*, 1994, No. 63-1231, art. 2, part 18.

191 Law on Health System of the Republic of Lithuania No. I-552. *Official gazette*, 1994, No. 63-1231; art. 13-1, part 3.

Fourthly, in the fourth paragraph of the article of the Law specifies the principles of funding: the *information system of state eHealth services and collaborative infrastructure is* financed from the state budget, the European Union structural funds, as well as from other statutory funding.[192]

However, the important provisions of the electronic health record are not laid down in the Law. Key attributes, structure and other important aspects of the e-health system have not yet been determined, and the Government is yet to attend to this matter. But it is noteworthy that such fundamental issues will be regulated by law as laws regulate the most important social relations. Human rights are the criteria of "importance" of social relationships. Laws regulate validation of human rights and freedoms, the definition of their content, legislative guarantees of protection and defence, and permissible limitation.[193] Since the right to health is established in the constitution[194], it is assumed, that the provisions of the mentioned Law should be supplemented with new aspects that consolidate the fundamental e-health principles and structure as well as provide the essential element of eHealth – the institution of electronic health record.[195]

Lithuanian has yet another important law, namely, Law of the Republic of Lithuania on the Rights of Patients and Compensation for the Damage to Their Health[196], which, among other things, provides a framework for patient's rights: right to choose the healthcare institution and the healthcare professional; right to information; right not to know; right of access to records of their medical documents; right to privacy; right to anonymous healthcare.

Article 7 of the Law regulates the patient's right of access to health records. Paragraphs 1 of the Article states: "*at the patient's request, upon presentation of the documents confirming his identity, the healthcare institution must, at the patient's expense, make and issue copies of the patient's medical*

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[192] Law on Health System of the Republic of Lithuania No. I-552. *Official gazette*, 1994, No. 63-1231; art. 13-1, part 4.

[193] Baublys, L., et al. Introduction to Theory of Law. Vilnius: MES, 2010, p. 259.

[194] Birmontas, V. Right to Provision of Health Services as Constitutional Value. *Health Politics and Management*. 2013, 1(5) 42.

[195] Štitilis D. E.health record and legal environment: present situation and problems. *Health politics and management*. 2014, No 1(6); p. 71.

[196] Law of the Republic of Lithuania on the Rights of Patients and Compensation for the Damage to Their Health No. I-1562, *Official gazette*, 1996, No. 102-2317.

records approved by the healthcare institution, as well as issue descriptions of the diagnosis and treatment". It should be noted that neither these provisions nor other rules of law allow for electronic health records, and in general they are not adapted to the electronic health system.

The same legal regulation which fails to meet today's realities is provided in the Law in regards to patient's consent (Chapter III of the Law).

According to foreign regulatory practice, patients' rights are often adapted to electronic health records by means of their regulation in relevant framework legislation. Therefore, this Law requires appropriate amendments.

1.6.3. Legal protection of privacy and personal data in case of electronic health record

The state audit report No VA-P-90-3-21 of 2013 on the *Protection of personal data processed in the automated mode* identifies areas which should focus on the protection of personal data. Among the areas referred to, the third place[197] is given for healthcare activities. This area will become even more relevant when the Republic of Lithuania starts using electronic health records on a large scale. In order to ensure an appropriate protection of personal data in the healthcare system, particularly in processing of personal data in electronic form, analysis should be made of how the current legal regulation complies with the requirements of e-health systems.

It should be noted that in order to eliminate disparities in regulation on legal protection of privacy in the Member States, the EU undertook the unification measures in this area by way of issuing the Directive on Data Protection 95/46/EC.[198] Thus, both in the EU and in Lithuania, the regulation should in principle be similar. However, the findings show that even after implementation of the Directive on Data Protection, certain national regulatory differences remained.

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[197] Protection of Personal Data Processed by Automated Mode. State Audit Report No. VA-P-90-3-21. 2003 [accessed 08-12-2014]. <http://www.vkontrole.lt/failas.aspx?id=3088>, p. 20.

[198] Directive of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data, 95/46/EC. *Official Journal*, 1995/ L 281, [accessed 08-12-2014]. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX: 31995L0046:en:HTML>.

Approved in 2008, the European Commission Recommendation on cross-border interoperability of electronic health record systems defines in detail the attributes to be complied with by relevant legislation[199]:

a) A person's choice shall be guaranteed, allowing the patient to freely and autonomously decide on the storage of personal data in electronic health records.
b) Electronic health record systems have to be designed and developed aiming at minimizing the collection of personal identification data.
c) In the case of e-health, processing of personal data, until electronic health records system implementation, shall include the evaluation of the risks of information security and the influence of the personal data security.
d) The volume of personal data, available electronically or online, shall be clearly defined. Processing of the genetic data online shall be limited unless there is a specific set of access control means.
e) The processing of personal data in electronic health records and related systems shall be carried out only by healthcare staff, who is obliged to maintain the confidentiality of personal data.
f) A reliable patient and healthcare staff identification shall be implemented.
g) Lawful access conditions to health data shall be defined.
h) It shall be ensured that patients are informed about the processing of their health data and the structure of the electronic health record. The information to the patients shall be easily understandable and clear.
i) It shall be ensured that the health data are retained in the jurisdiction where Directive 95/46/EC on Data Protection is operational.

Hereinafter, the analysis is provided on the compliance of the existing legal regulation on privacy with the above-listed European Commission recommendations.

Processing of personal data for the purposes of healthcare is regulated by the Law of the Republic of Lithuania on Legal Protection of Personal Data. Article 10 *Processing of personal data for healthcare purposes* regulates

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[199] Commission Recommendation of 2 July 2008 on cross-border interoperability of electronic health record systems, *supra* note 3, 14 p. a-l).

the power to handle personal health data, including the obligation to notify the State Data Protection Inspectorate regarding personal health data processing and the obligation to make a preliminary examination prior to the processing of such data. In all other cases, processing of personal health data is governed by the general provisions of this Law.

General rules also apply to the consent to process personal data regarding health. According to the Law of the Republic of Lithuania on Legal Protection of Personal Data, the consent is a voluntary declaration of will of the data subject for processing of his/her personal data with the purpose of which he/she is aware. The consent to processing sensitive personal data must be expressed clearly in writing, in its equivalent or some other form, which clearly demonstrates will[200] of the data subject. Although the requirements for consent in the domain of e-health are not separately identified, the general requirements for a person's consent ensure voluntary decision. The opinion of the Article 29 Data Protection Working Party states that the opt-out solutions do not meet the requirements set out in relation to the consent, including the consent to process personal data in electronic health record systems.[201] This means that in practice, obtaining appropriate consents throughout the EU and Lithuania should be subject to the opt-in systems.

However, it should be noted that under the Directive on Data Protection, the consent is not the only exception to the general prohibition to process personal health-related data. It is also subject to the following exceptions: the exception of the essential interests of the data subject; the exception of the data processing by medical staff; the exception of the substantial public interest. The latter exception is of particular importance for electronic health records. According to the opinion of Article 29 Working Party, notes that the arguments for introducing EHR systems may establish "substantial public interest".[202] According to the Law of the Republic of Lithuania on Legal Protection of Personal Data, in order to invoke the

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[200] Law on Legal Protection of Personal Data of the Republic of Lithuania No. I-1374, *Official gazette*, 1996; No. 63-1479, art. 2, part 12.

[201] Working document on the processinf of personal data relating to health in electronic health records (EHR). WP 131, *supra* note, 4, p. 9.

[202] Working document on the processinf of personal data relating to health in electronic health records (EHR). WP 131, *supra* note 4, p. 13.

public interest exception, the provisions of Clause 6 of Part 1 of Article 6 of the Law should apply.

eHealth data collection is governed by personal data processing requirements, defined in the Law. One of the requirements states that personal data should only be provided in the scope that is necessary for the collection and further processing.[203] Following this requirement, one of the data quality principles is implemented, which is laid down in the Directive No 95/46/EC on Data Protection. Thus, it may be stated that a requirement is ensured to store as little personal data as possible in the e-health system.

The requirement for risk assessment and impact on personal data security (before implementation of the electronic health records system) is indirectly determined by the provisions of the Law requiring to perform a pre-screening in the case of sensitive personal data. The pre-screening process includes the assessment of risks as well as the impact on the security of personal health data. Only after the pre-screening, the data controller may use an appropriate information system and to process sensitive personal data.

Part 6 of Article 30 of the Law provides that "*employees of the data controller, data processor and their representatives who process personal data must keep confidentiality of personal data if such personal data is not intended to be publicly available*". This general obligation means that processing of personal data in electronic health records and relevant systems can be carried out only by healthcare professionals who are obliged to maintain the confidentiality of personal data.

Reliable identification and authentication of patients in electronic health record systems is critically important.[204] Although there are no binding fundamental legal norms governing identification/authentication of persons, it should be noted that Part 2 of Article 30 of the Law on Legal Protection of Personal Data provides that "*the State Data Protection Inspectorate establishes the general requirements for technical and organisational security measures of the data*". General requirements for technical and organisational security measures of the data were approved by the State Data Protection

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[203] Law on Legal Protection of Personal Data of the Republic of Lithuania No. I-1374, *Official gazette*, 1996; No. 63-1479; art. 3, part 1, p. 4.

[204] Working document on the processinf of personal data relating to health in electronic health records (EHR). WP 131, 2007, *supra* note 4, p. 14.

Inspectorate in 2008.[205] These requirements consolidate three security levels, and requirements are defined for each regarding technical and organisational security measures. The highest level of security is the third level: *"the organisational and technical security measures attributed to this level of security shall be ensured by data controllers, who automatically process sensitive personal data in the database(s), which is (are) accessed via external data transfer networks".*[206] E-health systems meet the third level indications. All levels are required to ensure management and control of the access to data:

- *"access to personal data can be granted only to a person who needs the personal data to perform his functions;*
- *personal data can be used only for actions, for the performance of which the right has been granted;*
- *if the identity confirmation is based on passwords, confidentiality shall be ensured for passwords at issuance, submission, regular changing and retaining;*
- *the organisational and technical security measures of the data shall be ensured to protect the database from unauthorised access by electronic means of communication".*[207]

It may be stated that these requirements ensure the identification of healthcare professionals connecting to e-health systems. Although the identification is not mentioned directly, some of the provisions are associated with identification and authentication elements.

A question arises on the extent the identification in cyberspace must be regulated by specific legal norms (separate pieces of legislation). The minimum requirements for identification in cyberspace are advocated by authors Štitilis, Pakutinskas, Laurinaitis and Dauparaitė in the scientific monograph on identity theft in cyberspace, expressing the view that the state should establish minimum requirements for identification.[208] The position

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[205] Common Requirements for Organizational and Technical Data Protection Measures. Order of Director of State data Protection Inspectorate No. 1T-71(1.12) of 12 November 2008 [accessed 08-12-2014]. <http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=331500&p_tr2=2>.

[206] *Ibid.*, part 7.3. / *Ibid.*, part 9.2.

[207] *Ibid.*, part 9.2.

[208] Štitilis, D., Pakutinskas, P., Laurinaitis, M., Dauparaitė, I. Identity Theft in Cyberspace: Social, Electronic Business and Legal Regulation Issues. Collective Scientific Monograph. Vilnius: Mykolas Romeris University, 2011, p. 150.

is that the state should regulate the identification in cyberspace, including e-health systems as well, and such regulation should be executed not by a ministerial Order, but by law or (by delegation of) a resolution of Government. However, regulation at such a level in non-existent in Lithuania yet.

It should be noted that the State Data Protection Inspectorate has also adopted another secondary legislation: the Procedure for personal identification in cyberspace.[209] However, Clause 1 of this Procedure provides that it applies only in cases when electronic documents are submitted by means of communication to the State Data Protection Inspectorate. Thus, the scope of the procedure application is heavily restricted.

While the conditions of legal access to health data are not regulated by the Law of the Republic of Lithuania on Legal Protection of Personal Data, the above-mentioned general requirements for technical and organisational protection measures of the data include a requirement for the third level of protection, stating that there shall be a procedure defined for providing, terminating and changing the access rights and powers for processing of personal data. Thus, a the secondary legislation imperatively commits data controllers to set the conditions of lawful access to health data.

Notification of the data subject regarding processing of health data is governed by the Law of the Republic of Lithuania on Legal Protection of Personal Data. Article 24 regulates "notification of the data subject about processing of his/her data". This article defines in detail the conditions of notification of a data subject, which apply to electronic health records as well.

The requirements to retain health data in the EU jurisdiction are indirectly defined in Chapter 8 of the Law of the Republic of Lithuania on Legal Protection of Personal Data, which regulates the provision of personal data to foreign countries, especially outside the EU. It is assumed that in the EU, personal data may be accessible (including retention) without restrictions. However, provision of data to third countries has certain restrictions. Therefore, it can be stated that Lithuania has an established regime that restricts the provision of data to third countries.

In spite of the existing legal regulation in the area of privacy and personal data protection, it should be noted that on 25 January 2012, the Eu-

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[209] Order of Validation of Personal Identity. Order of Director of State Data Protection Inspectorate No. 1T-33(1.12) of 17 June 2011. *Official gazette*, 2011, No. 76-3714.

ropean Commission proposed a comprehensive reform of the EU rules on personal data of 1995 in order to strengthen online privacy rights and boost the digital economy of Europe. The cornerstone of the reform is the Draft Data Protection Regulation.[210] It is worthwhile to mention the provisions of the Draft Regulation related to the processing of health data. Recital 123 of the Regulation stipulates that processing of health-related data, which are subject to higher standards of protection, can be justified for a variety of legitimate reasons related to the interests of a person and the society, especially when it is necessary to ensure continuity of provisions of cross-border health services. Thus, the regulation could potentially directly determine the possibility to collect health data without the consent of patients (based on legitimate interests).

In summary, it can be stated that the legislation of the Republic of Lithuania with regard to the legal protection of the privacy and personal data in the electronic health records ensures an adequate legal environment. The only thing to be questioned is the legal regulation of personal identification, which is to be moved to a higher level. The new Draft Data Protection Regulation can potentially introduce several innovations in the domain of e-health, but this draft has not been approved yet, and its provisions are not final.[211]

1.6.4. Summary and suggestions for improvement of the legal regulation of e-health records

Some legal aspects, which are key but not exclusive, yet pertaining to electronic medical records were analysed. Both, the research efforts of foreign authors and relevant studies examine issues of legal regulation on the protection of electronic health records (data breaches, information about data breaches, different protection levels), retention of electronic health records, patient rights to electronic health records, sending of electronic health records to other countries, and receiving of electronic health records from other countries.

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[210] Proposal for a Regulation of the European Parliament and of the Council on the protection of individuals with regards to the processing of personal data and on free movement of such data (General Data Protection Regulation). COM(2012)11 final, 2012. [accessed 05-12-2014]. <http://ec.europa.eu/justice/data-protection/document/ review2012/com_2012_11_en.pdf>.

[211] Štitilis D. E.health record and legal environment: present situation and problems. *Health politics and management*. 2014, No 1(6); p. 76.

Since the legal environment of e-health records is still under evolution, in the future the scientific literature, as well as theoretical and practical studies, will look into a wider range of regulatory issues. Meanwhile, the author will potentially discuss certain additional elements of the legal environment pertaining to the electronic health record in other research papers.

Lithuania should adopt additional fundamental rules of law governing electronic health record. Electronic health record in Lithuania should be legitimated as a separate institution. Provisions of secondary legislation for identification in electronic data systems, which is valid in Lithuania, should be transferred to the statutory level (or by delegation, should be regulated by a resolution of the Government). The implementation of electronic health record systems should consider an overriding exception of the public interest, provided for in the Data Protection Directive. This exception allows the deployment of the systems of electronic health records without a prior consent of the user. Undoubtedly, data protection principles must be ensured (transparency, proportionality, etc.). Lithuanian legal acts should also deal with the following issues: security of electronic health records (data breaches, information about data breaches, different protection levels), retention of electronic health records, patient rights to electronic health records, sending of electronic health records to other countries, and receiving of electronic health records from other countries.

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2. THE EUROPEAN EXPERIENCE IN THE AREA OF NATIONAL PROCESSES OF ICT IMPLEMENTATION IN HEALTHCARE SECTORS:

a framework for in depth analysis of the process in each EU member state

dr. Rasa Rotomskienė

Nobody will argue about the growing importance of ICT in human life including public policy domains and the delivery of public services. Nationally integrated eHealth infrastructure and information systems are now viewed as key enablers for safe, efficient, high-quality, patient-centred and seamlessly delivered healthcare. Yet high failure rates of complex ICT projects, which are typically associated with the national process of ICT implementation in health, often lead to wasted public finance investments and failed processes in an extremely risk-sensitive environment such as healthcare. There is growing evidence taking into account both academic research and practical implementation of ICT that a national process of deployment of ICT in healthcare should be considered as a process that requires carefully thought-through multi-level change strategies and more complex approaches.

Already in eHealth Action Plan in 2004 the European Commission directed to regularly monitor the state of the art in deployment of eHealth, the progress made in agreeing on and updating national eHealth roadmaps, and to facilitate the exchange of good practices. A similar commitment was repeated in a recently published European Commission strategic paper – the eHealth Action Plan for 2012–2020: "The Commission will closely monitor the implementation of this Action Plan and report on the progress made and the results achieved".[212]

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[212] Communication from The Commission to The European Parliament, The Council, The European Economic and Social Committee and The Committee of The Regions, eHealth

According to the only report, assessing progress on implementing the national eHealth programmes/plans to review fulfilment of the objectives proposed in the national roadmaps, which was published by the EC in 2011 as part of the responsibility to monitor eHealth Strategies assigned to it, to date almost all EU member states have developed their national or regional Health roadmaps.[213] The content and the implementation, however, vary widely among the members states. Allocation of responsibility for eHealth strategy development and their implementation is not uniform in the EU Member States either. In the majority of countries, the responsibility lies largely with the Ministry of Health. In others (e.g., Estonia, Ireland, Italy, Hungary or the Netherlands), responsibility is more widespread across several ministries and/or agencies, such as those responsible for new technologies, innovation and/or telecommunications. In countries with decentralised health systems (such as Finland, Italy and Spain), or in countries where several ministries (for instance, Belgium and Italy) are involved, there is a strong need for a concerted official eHealth strategy with common goals that are agreed among these different institutions.[214]

By now, more than a dozen countries have established legal entities as specific consultative bodies or competent authorities responsible under ministerial supervision. Their role is to develop, oversee and monitor the country's strategic goals, and/or implement and manage eHealth infrastructure and application projects. For instance, in the Slovak Republic, the National Health Information Centre (NHIC) was established as an eHealth "think-tank" body. In Germany, the "gematik" organisation has been given the responsibility for nationwide eHealth activities by law. It seems that

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Action Plan 2012–2020 – Innovative Healthcare for the 21st Century. Brussels, 6.12.2012 COM(2012) 736 [accessed 04-12-2014]. <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52012DC0736>.

[213] European countries on their journey towards national eHealth infrastructures [accessed 05-12-2014]. <http://www.ehealth-strategies.eu/report/eHealth_Strategies_Final_Report_Web.pdf>. The European Commission (2014) The Final Report on Benchmarking Deployment of eHealth among General Practitioners. March 24, 2014 [accessed 06-12-2014]. <http://www.open-evidence.com/final-report-benchmarking-deployment-of-ehealth-among-general-practitioners/>.

[214] The European Commission (2014) The Final Report on Benchmarking Deployment of eHealth among General Practitioners. March 24, 2014 [accessed 06-12-2014]. <http://www.open-evidence.com/final-report-benchmarking-deployment-of-ehealth-among-general-practitioners/>.

throughout many Western national healthcare services, extensive eHealth infrastructures and systems are now viewed as central to the future provision of safe, efficient, high quality, citizen-centred health care.

The most important question here then is how the national processes of ICT deployment in health are managed internally in each member state, what are the factors that influence the success or failure of the nationally implemented e-health programmes and projects, are there any approaches or guidelines that could guide or warn against the member states in the national processes of ICT implementation in healthcare sector.

Despite the particularities of national contexts, analysis of the international and European experience so far shows that there are two main approaches emerging. The more "successful" countries in this respect have more features of a so-called the "Welsh approach" (for instance, Denmark, The Netherlands, Finland and other), the others are following more "traditional" pathways or in this analysis called the "English approach" (before 2011). Based on in-depth analysis of these two approaches, a general framework for analysing implementation process in each member state is developed and offered for further use. However, because of the complexity of the process and manipulations with the publicly available information in the majority of cases credible findings are only possible, if the researcher has an insider's view and can speak the local languages.

2.1. Two main approaches towards the national implementation of ICT in healthcare sector: the processes in Wales and England

It is necessary to mention that following most recent devolution processes and the constitutional amendments that took place in Wales, Scotland and Northern Ireland in 1997–1998, the assigned governance of healthcare delivery to the responsibility of so-called four "home countries" in 2002–2005 resulted in four separate national programmes (or organisational structures beneath them) delivering ICT in their healthcare sectors: *Connecting for Health* (CfH) in England, *Informing Healthcare* (IHC) in Wales, *Scottish Care Information* (SCI) in Scotland and *Health and Personal Social Services* (HPSS) *ICT Programme* in Northern Ireland. Whereas the English *Connecting for Health Programme* was facing major difficulties throughout the whole delivery process, to say nothing about long-term sustainability of changes, the emerging approach taken in Wales was, on the contrary, sustainable and promising good results from the very beginning. To forestall the events it is worth mentioning, that in 2011 NHS *Connecting for Health* was ceased to exist by recognising that "this has been a sorry saga" of £11.4 billion wasted tax payers money[215] whereas the Welsh programme and the process of ICT implementation in health in Wales has expanded since then and now the whole process is managed by even larger organisation that the *Informing Healthcare* has transformed itself into – the *NHS Wales Informatics Service* with about 500 specialists working for the organisation. In England on 31 March 2013 a new organisation was established to manage the process of ICT delivery in health. It is called the Health and Social Care Information Centre of which the approach is now more similar to the Welsh approach than the one that England was applying before 2011.

2.1.1. National Process of ICT Implementation in Healthcare Sector in England before 2011

Key features of the implementation process

The following features are the main characteristics of the national process of ICT implementation in health in England:

- A top-down change implementation approach;
- A technocratic view towards ICT-led organisational change;
- Unbalanced power of large IT suppliers and management consultants and the NHS;
- 'Big bang' approach / 'Rip and replace' strategy; and
- Lack of stakeholder engagement.

In relation to ***top-down approach*** and contrary to the promised, the national process of ICT implementation in health was led by large IT companies rather than being closely coordinated by the government or the ultimate user – the health care service. According to witnesses[216], the crucial contracts were advertised, bid for and signed at record speed – in May 2003

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[215] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems" [accessed 06-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

[216] The Private Eye, 6 March 2007.

bidders were handed a 500 page draft of "a detailed output based specification" and given five weeks to get their proposals in. All contracts were in place within a year, against an average for large public sector deals of 27 months, including the time required for the all-important task of deciding exactly what should go in them. Later reviews of failed programme IT initiatives had shown that this process should have required a close involvement of those who would eventually have to use the systems.[217] In addition, there were many statements made on various occasions that successful deployment of IS relies largely on effective cooperative working between the parties involved, with the local and clinical engagement being among the most important elements of success in the process. However, under the national process framework Trusts (main administrative entities in the UK, responsible for managing the delivery of acute hospital health care services in a particular geographical location) had no formal contractual relationships with IT suppliers (i.e. their Local Service Providers) to be able to manage this relationship more effectively. This responsibility was left within the Trusts themselves and success varied greatly across the regions.[218] Moreover, with majority of contracted IT suppliers experiencing considerable difficulties and delays in delivering the products and partly because of that downsizing the specifications of the IT systems, the individual NHS Trusts or NHS as a whole were legally exposed to face financial penalties if not enough of them choose to take the information systems and meet the contract (Bruce, 2010).

In respect to a ***technocratic view towards ICT-led organisational change***, this wasn't expected from the very initial documents that were delivered in anticipation of the *Connecting for Health*. On the contrary, a parliamentary briefing paper on the programme has demonstrated sensitive awareness of the challenges ahead and highlighted the importance of stakeholder engagement and communication during "imposing change on a highly devolved

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[217] NAO (2006). Department of Health: The National Programme for IT in the NHS, Report by NAO. 16 June 2006, [accessed 03-09-2011]. < http://www.nao.org.uk/publications/0506/department_of_health_the_nati.aspx>. and NAO (2011). Department of Health The National Programme for IT in the NHS: an update on the delivery of detailed care records systems. Report by the Comptroller and Auditor General HC 888 Session 2010–2012, 18 may 2011.

[218] *Ibid.*

NHS".[219] The document also emphasised that for the new IT to be introduced successfully, substantial efforts will need to be given to non-technical issues, such as rationalising how work is carried out, encouraging people to use new systems and new ways of working and learning from experience. The more so that the organisational costs of managing the changes introduced by IT will be least as much as delivering the IT part itself and were expected to be released by the NHS organisations. Clinical engagement and involvement of other stakeholders in the national programme was associated with the delivery what people need; the importance of local leadership and buy-in, and overcoming of scepticism created by previous IT failures. But once the programme started a prevailing view by the Programme suggested a contradicting approach that was taken: "all that was needed, was for the many decent IT companies to "join up" and "roll out" what was already out there and within a couple of years the NHS would be electronically transformed".[220] Comments of both the insiders of the Connecting for Health and external observers only confirmed this conclusion. For instance, Professor Peter Hutton, who resigned as the Programme's clinical leader, later summed up: "In those early days, it was like being in a juggernaut lorry going up the highway and it did not really matter where you went as long as you arrived somewhere on time. Then, when you had arrived somewhere, you would go out and buy a product, but you were not quite sure what you wanted to buy. To be honest, I do not think the people are selling it knew what we needed".[221] Other observers also concluded that the focus of health IT in the NHS has usually been on the technical delivery of the IT, not managing the change and the multitude of stakeholders.[222] As a result, the problems that come out of the lack of management, supplier accountability, the failure to proactively communicate, along with cultural challenges, have been allowed to persist and combined usually brought many projects to the failure.[223] The *Connecting for Health* was not an exception. To have an independent programme management with industry experience of large

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[219] POST, February, 2004.

[220] Bruce S. NHS could still be penalised under NPfIT, 2010, [accessed 12-12-2014]. <http://www.ehi.co.uk/news/ehi/6287>.

[221] The Private Eye, 6 March 2007.

[222] Government & Public Sector Journal, July 2011.

[223] *Ibid.*

scale transformation not involved in the technical/operational delivery, but in execution of the transformation plan and in driving the progress, was mentioned among the aspects of how very technocratic view towards technology-let change could be avoided or reduced. However, in the case of *Connecting Health*, IT suppliers were advising government and, therefore, had control of both the programme and operational delivery, but also imposed a very technocratic approach towards organisational change. The way the centralised procurement for *Connecting for Health* was undertaken also contributed to the approach. According to the experts, it was a mistake to put a commercial value on the programme before specific requirements were finalised. This has only resulted in downstream problems in executing technical delivery together with damaging supplier partner relationships with the client.[224]

Today's practical delivery results recognise that "where care records systems are in place, they are not yet delivering what the department had expected. In acute trusts, the systems are mainly providing administrative benefits, rather than the expected clinical ones, such as prescribing and administering drugs in hospitals".[225]

The unbalanced power of large IT suppliers and management consultants and the NHS is among the main specifics of the national ICT implementation process in NHS England. As mentioned below, this was visible from the very beginning: a small number of big suppliers were handed over 10 year monopolies in NHS IT with the government legally facing enormous compensation claims, if contracts were not met. As a result of procurement process, five big winners of the multi-billion pound procurement were selected as five "local service providers", namely Accenture, Fujitsu, BT and Computer Science Corporation (CSC) of the US with value of the contracts multiplying as a year goes by. According to witnesses, "the choice of big firms for big contracts reflected Granger's macho approach that "all that was needed to implement ICT in NHS England, was for the many decent IT companies to "join up" and "roll out" what was already

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[224] Government & Public Sector Journal, July 2011.

[225] NAO. Report by the Comptroller and Auditor General, HC 888, SesSIon 2010–2012, 18 May, 2011. Department of Health, The National Programme for IT in the NHS: an update on the delivery of detailed care records systems. [accessed 03-09-2014], <http://www.nao.org.uk/publications/1012/npfit.aspx>.

out there and within a couple of years the NHS would be electronically transformed".[226] For this so called companies with "financial muscle" were invited to participate, claiming that they would only be paid for delivering results and that, should they fail, he would hold their "feet to the fire".[227] The big contractors, in turn, relied on software specialists of smaller IT companies, where, for instance, iSoft then won the contract to develop IS software in three areas for more than half of the country's acute hospitals. The package included strategic Lorenzo software programme – the main software to support programme's central objective – the care records service as the foundation for transforming more than 100 (or three-fifths) of acute hospitals in England. The company had promised to deliver that by March 2004, but it was not delivered until the very end of the Programme in 2011. Instead, to make any progress at all the companies were forced to use iSoft's old software, while the date for Lorenzo's arrival was put back to 2008 and later to 2016.[228] The NHS trusts, however, were forced to take and go live with scaled back versions of information systems, which in some cases offered less or inadequate functionality that the ones they have replaced and definitely not meeting promises once made by ministers and the Department of Health‘s financial contractual commitments to selected IT suppliers. Only at the end of 2010 this situation was started to being changed. A statement by the NHS‘ director general of informatics was made that "those trusts who don't take Lorenzo can do what they want and they won't get penalised, however if the NHS as a whole do not get enough trusts in totality to meet the contract then the NHS as a whole will be penalised".[229] It seems that the main purpose of the Programme was to hand in the contracts and wait until the products are developed and deployed within healthcare organisations. Moreover, suppliers were threatened with large penalties for

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[226] Bruce S. NHS could still be penalised under NPfIT, 2010, [accessed 12-12-2014]. <http://www.ehi.co.uk/news/ehi/6287>.

[227] The Private Eye, 6 March 2007.

[228] NAO. Report by the Comptroller and Auditor General, HC 888, SesSIon 2010–2012, 18 May 2011. Department of Health, The National Programme for IT in the NHS: an update on the delivery of detailed care records systems. [accessed 03-09-2014]. <http://www.nao.org.uk/publications/1012/npfit.aspx> and eHealth Insider, 20 May 2008. NHS says Lorenzo won't be complete until 2016. [accessed 03-09-2014]. <http://www.ehi.co.uk/news/ehi/3764>.

[229] Bruce S. NHS could still be penalised under NPfIT, 2010, [accessed 12-12-2014]. <http://www.ehi.co.uk /news/ ehi/6287>.

not delivering or otherwise breaking the contracts. As recognised later, this was among the leading causes for major delays resulted from suppliers' attempts to hide the difficulties they were experiencing to avoid penalties and bad publicity that could damage their reputation. No governmental institution (including the Department of Health or the Parliament) had, or more precisely, used the power to control the process, but several public hearings at the Commons Public Accounts Committee. The big hope for critics at that time was the upcoming report by the National Audit Office – an institution that is obliged to scrutinise public spending on behalf of the Parliament – due out early in 2006. Delivered in June, the report appeared to be disappointing – it only barely looked at the failures, ignored the fact that already then the Programme was behind the schedule and in particularly lacked stakeholder views.[230] A few weeks later the BBC had uncovered that the actual content of the report was influenced by the Programme. Missing findings from the final version of the report included comments that the Department of Health had been "slow to demonstrate clear and effective leadership to engage NHS organisations and that the NHS, in general, lacks the sufficient skills to make the scheme a success.[231]

According to Richard Bacon, Member of Parliament and of the Commons Public Accounts Committee, such national procurement approach had worked for PACS and the NHS secure network (N3), but it had not worked for more complex hospital systems, inadvertently locking the NHS into contracts with suppliers unable to deliver: "the crisis is a direct result of the original foolish decision made on a No 10 sofa – to allow the programme to be held hostage by a tiny group of Local Service Providers and their preferred software suppliers. The result was a set of contracts signed before either the government had understood properly what it wanted to buy, or the suppliers had understood what it was they were expected to supply. Seeing a system apparently working on a single large screen did not necessarily prove it would work when used by doctors and health staff across many PCs at various hospital sites that form an NHS trust".[232]

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[230] Informaticopia, 22 June, 2006.

[231] The Private Eye, 6 March 2007.

[232] ComputerWeekly.com, 16 June 2008; eHealth Insider, 20 May 2008. NHS says Lorenzo won't be complete until 2016 [accessed 03-09-2014]. <http://www.ehi.co.uk/news/ehi/3764>.

Regarding management consultants, this was and still remains a large issue in relation to *Connecting for Health*.[233] As recent NAO report[234] shows, that this is not a single-case issue at all: although has fallen in recent years, total spending on external management consultants by governmental departments remains high and totals approximately £1 billion per year. Moreover, the government is not getting value for money from their use because it often lacks the information, skills, and strategies to manage them effectively.[235] Only a few departments can provide information on their spending by type of consultancy, the number of interims employed, or interims‘ roles and length of contracts. The price that departments pay is often based simply on time spent on a project, rather than being fixed in advance or related to the achievement of specific objectives. Most departments do not assess the performance of consultants or whether the work done was of benefit.[236]

'Big bang' approach and 'rip and replace' strategy – were also been among the features of the *Connecting for Health* in England. With the big bang adoption, the switch between using the old system and using the new system happens on one single date, the so-called instant changeover of the system. Everybody start to use the new system on the same date, and the old system will not be used anymore from that moment on. It differs from so-called 'phased adoption' and 'parallel adoption', when the adoption either happens in several stages or users are able to do the work using the old system while getting used to a new one. More risky – the 'big bang' approach was often exercised in relation to *Connecting for Health*. Accompanied with 'rip and replace' strategy this created even bigger challenges for achieving a successful adoption. In some cases though this was unavoidable, because according to the NAO report[237], in some Trusts, the old

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[233] The Private Eye, 6 March 2007.

[234] NAO, Central government's use of consultants and interims. Report by the Comptroller and Auditor General, H C 488, Session 2010–2011, 14 October 2010 [accessed 03-09-2014]. <http://www.nao.org.uk/publications/ 1011/use_of_consultants.aspx>.

[235] *Ibid.*

[236] *Ibid.*

[237] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems" [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

systems had been developed over many years, but were unable to support the major aims of the Programme such as interoperability (i.e. be able to share care records with other parts of the NHS) and were unsustainable in the long term. However, this was not always the case. Even knowing that the deployment of a major new system will always create challenges for staff because it is likely to require fundamental changes in the way they work, in some cases new systems were of less or inadequate functionality than the ones they replaced. For instance, in acute trusts, the systems were mainly providing administrative benefits, rather than the expected clinical ones, such as prescribing and administering drugs in hospitals[238]. This created even higher challenges in relation to stakeholder engagement as the key factor in staff acceptance was the level of functionality provided by the new system relative to the previous one. For instance, one Trust had to replace an elderly but fully integrated administration and clinical system with a new care records system and several non-integrated clinical systems and this change had a very negative impact on the Trust's ability to engage clinical staff.[239] Moreover, there were psychological factors involved by some employees having a sense of loss in moving to a new system that could only be customised to some extent and over a period of time[240]. Only in 2010, the approach was started being changed by the Department of Health moving away from its intention to replace systems wholesale, instead, building on, using Trusts' existing systems and linking them to get them working together[241].

Lack of stakeholder engagement was and still is a cross-cutting aspect in failing national ICT implementation process in NHS England. Contrary to the initial statements, when a promise was made that the NHS IT will be transformed by imposing "stringent national standards" and improved procurement along with the local control by clinicians and the local IT specialists working in the healthcare organisations[242], actual process barely involved those who would eventually use the systems. First of all, there is

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[238] *Ibid.*

[239] *Ibid.*

[240] *Ibid.*

[241] *Ibid.*

[242] Department of Health, 2002.

plenty of evidence, that ticking the box marked "users consulted", as required by the official procurement rules, was only a formal requirement. For instance, according to witnesses, an instruction was given by the Programme director to "go and find some clinicians" who had seen earlier drafts and could therefore be deemed to have been involved in the procurement process[243]. Another statement was made by an insider of the Programme that "in his eagerness to meet New Labour's impatient timetable, Granger (the *Connecting for Health director*) did everything to ensure that the messy business of consultation put up no obstacles".[244] Moreover, almost every report in relation to the Connecting for Health[245] in one or another way were mentioning the need for / lack of clinical engagement. For instance, NAO report stated that early involvement of users and user organisations and transparent communication about progress help to ensure broad support for change, maintain users' confidence in what is being delivered and, therefore, increases the likelihood of successful implementation[246].

However, in relation to *Connecting for Health*, wider engagement and mobilisation of the NHS was not started until the Programme judged that procurement "had reached a sufficient stage of maturity to be able to communicate its outcome in a meaningful and efficient way". Lack of engagement with NHS organisations was associated with the changing national leadership for engagement and "resource constraints, which limited the scale of early engagement efforts".[247] Yet similar conclusions were made by

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[243] The Private Eye, 6 March 2007.

[244] *Ibid*.

[245] NAO (2006). Department of Health: The National Programme for IT in the NHS, Report by NAO. 16 June 2006, [accessed 03-09-2014]. <http://www.nao.org.uk/publications/>. 0506/department_of_health_the_nati.aspx; ; Committee of Public Accounts, 2007.

[246] NAO (2006). Department of Health: The National Programme for IT in the NHS, Report by NAO. 16 June 2006, [accessed 03-09-2014]. <http://www.nao.org.uk/publications/0506/department_of_health_the_nati.aspx>.

[247] NAO (2006). Department of Health: The National Programme for IT in the NHS, Report by NAO. 16 June 2006, [accessed 03-09-2014]. <http://www.nao.org.uk/publications/0506/department_of_health_the_nati.aspx>; NAO. Report by the Comptroller and Auditor General, HC 888, SesSIon 2010–2012, 18 May 2011. Department of Health, The National Programme for IT in the NHS: an update on the delivery of detailed care records systems. [accessed 03-09-2014]. <http://www.nao.org.uk/publications/1012/npfit.aspx>; and Committee of Public Accounts, House of Commons. Department of Health: The National Programme for IT in the NHS, Twentieth Report of Session 2006–07 Report, together with formal minutes, oral and written evidence, HC 390 [Incorporating HC 1360-i of Session 2005-06]. Published on

the Committee of Public Accounts of the House of Commons in 2007. The Department of Health was urged to improve the way it communicates with NHS staff, especially clinicians.[248] The more so because of serious problems with systems that have been deployed, seemed to be further contributing to the resistance of clinicians. Recommendations included the need to initiate an urgent review of the extent of clinical involvement in the specification of the systems and the impact assessment in cases where this was done.[249] The Later public report[250] had recognised some progress in relation to clinical engagement within the last two years. Three aspects were praised as promising more success than it has been since the beginning of Programme: the appointment of Chief Clinical Officer of the Programme, expanding the network of the National Clinical Leads and the creation of more opportunities to engage clinicians and other NHS staff. Appointed in 2006, The Chief Clinical Officer was supported by an Office of some 50 staff, including two National Clinical Directors for primary care and secondary care. The role of the Office was to enhance the clinical leadership of the Programme and ensure that improving the quality and safety of patient care is embedded in every aspect of NHS Connecting for Health's work. Also, The Chief Clinical Officer supervised the clinicians employed to work on the Programme, including the National Clinical Leads, who worked part-time for the Programme while continuing with their clinical work. According to the report, spending by the Chief Clinical Officer totalled £6.0 million in 2007-08, against a budget of £12.2 million that year. The network of Clinical Leads was expanded from seven appointed in 2004 to 15 in 2008 and comprised four occupational groups (GPs, hospital doctors, nurses, and allied health professionals) as well as midwifery, pathology, diabetes care, public health, medications management, ophthalmology and mental health. One National Clinical Lead was appointed to cover and provide assurance about

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11 April 2007 by authority of the House of Commons. London: The Stationery Office Limited, [accessed 03-09-2014]. <http://www.publications.parliament.uk/pa/cm200607/cmselect/ cmpubacc/390/390.pdf>.

[248] *Ibid.*

[249] The Committee of Public Accounts of the House of Commons, 2007.

[250] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems" [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

the safety of the new systems on patient safety issues. A declared role of the Clinical Leads was "to act as advocates for the Programme and to facilitate two-way communication between NHS Connecting for Health and staff within the NHS, for example via meetings with professional bodies, presenting at conferences and other events, and producing newsletters". They role also included work with the National Advisory Groups, including representatives of professional organisations and the Royal Colleges. Actions were taken to involve clinicians and other NHS staff in the process of IS's development in attempt to replace prevailed temporary arrangements of *ad hoc* advice, "which had suffered from a lack of continuity and difficulties in getting staff released by NHS Trusts to work on the Programme".[251] However, the conclusion was made that despite the fact that arrangements for engaging with clinicians and NHS staff have been strengthened, there was still progress to be made before all staff are convinced of the benefits of the Programme.[252] Examples of improvements that were suggested by the NHS included more open communications from NHS *Connecting for Health* and providing clinicians with more advance notice of events to make it easier for them to attend.[253]

The outcomes of the "English approach"

The following were identified as the main outcomes of the *Connecting for Health* national approach towards the implementation of the ICT in healthcare sector:

- Delivered systems were difficult or not possible to use;
- Resistance to change;
- Lack of local change ownership and commitment by the stakeholders;
- Lack of real expectations and deadlines;
- IT suppliers trying to hide their difficulties;
- Hindered conditions to become an 'intelligent client';
- The process is led by large IT companies rather than the needs of the NHS;
- Disappearing locally accumulated knowledge and skills;

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[251] *Ibid.*

[252] *Ibid.*

[253] *Ibid.*

- Hindered NHS' capabilities to innovate;
- Service fragmentation instead of cooperation / integration;
- IT failures hurting patient care;
- No value for money.

There is plenty of evidence that a lot of ***delivered systems*** were ***difficult (if at all) to use***. For instance, back in 2005 Queen Mary's Sidcup NHS Trust was among the first in London to use the new patient administration system from the *Connecting for Health*. But alongside the technical challenge posed, Trust chief executive said its commitment to tapping the *Connecting for Health* "also left it under financial pressure and facing an income loss of about £3m".[254] This mainly came from rolling out the new systems from BT, which was the local service provider for the *Connecting for Health* in London. The rolling out a new system had lengthened waiting times and contributed to the hospital missing its annual accident and emergency targets, because installed software appeared to be incompatible with other systems or were difficult to use: "GPs could not send their referrals; the new coding took a lot longer to do, and a number of patients were not on the system – so the Trust did not get paid for them (*ibid.*). According to the Trust, this was mainly due to system downtime, lack of staff training and a struggle with the new role-based access approach to the application". Moreover, in such situations the Trusts were left on their own as they had no or very limited means to seek re-compensation if any unnecessary costs or losses were involved. According to the Trust chief executive, "Trusts had to live with the consequence of decisions made by *Connecting for Health* contractors, which they had no part in making", "a lack of contractual control was a drawback to the design of the programme: "if a delay increased costs of a particular NHS organisation, it had no legal power to recover them". Another issue, which was spelled out as being problematic not only in this particular case, but for the Trusts in general in dealing with the *Connecting for Health* and the local service providers, was the fact that problems were taking a long time to resolve because of the lengthy chain of command. Trusts were not prepared for the level of business change its IT overhaul involved, because "staff did not understand how much IT drives

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[254] ComputerWeekly.com, 07 November 2006. Trust feels pain of NHS IT roll-out., [accessed 03-09-2014]. <http://www.computerweekly.com/Articles/2006/11/07/219625/Trust-feels-pain-of-NHS-IT-roll-out.htm>.

their clinical processes and they did not understand the changes they would need to make to their processes".[255]

Even greater disasters were soon to follow. For instance, at Nuffield Orthopaedic Centre (NOC) Fujitsu's software installation caused "a serious situation" urging a so-called "serious untoward incident" report to the National Patient Safety Agency. According to the Agency, problems included "inability to print patient invitation letters and incorrect schedules for patients who need to be seen by particular dates".[256] Operations were cancelled, and the board reported a "significant backlog of outpatient appointments", causing the Trust's three-star rating to be replaced by a "poor" label.[257]

Discontent even further when Trust were forced to replace their well-functioning in-house developed IS with those only providing part of the functionality of their legacy applications, because the local ones, although meeting the specific needs of the Trust at the point in time, were judged being unable to support the aims of the Programme.

Because of this situation, the Department of Health has revised its approach in the beginning of 2010 and allowed the NHS Trust to build on their existing systems where this is possible and take the elements of the *Connecting for Health* systems only in the areas they most require.[258] To support interoperability of the systems, the Department has developed a set of standards which systems will be required to meet. However, there is also a risk that in the situation with a variety of existing systems, there is an increased risk of not achieving adequate compatibility across the NHS to effectively support joined up healthcare.

Resistance to change was and remains among the major obstacles in relation to *Connecting for Health* in England as well. The issue is mentioned in all NAO public reports[259] as well as regularly appearing in the national

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[255] *Ibid.*

[256] BBC News, 14 March 2006.

[257] *Ibid.*

[258] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems". [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

[259] Ibid. and NAO (2006). Department of Health: The National Programme for IT in the NHS, Report by NAO. 16 June 2006, [accessed 03-09-2014]. <http://www.nao.org.uk/publications/0506/department_of_health _the_nati.aspx>.

media both as either deployed systems were not used, or Trusts rejecting to take on *Connecting for Health* systems in overall. Many explanations were delivered alongside with majority of them referring to 'soft' or human-related aspects of organisational change. One of them is the fact that the some Trusts have developed their old systems over many years often with the direct involvement of Trust staff. The systems did meet their specific needs. When these systems were judged by the *Connecting for Health* as unable to support the aims of the Programme (for example, in terms of sharing care records with other parts of the NHS etc.) and were therefore declared as being unsustainable in the longer term, it was therefore common to find that some staff felt a sense of loss in moving to a new system that could only be customised to some extent and over a period of time.[260] Another key factor in staff acceptance was the level of functionality provided by the new systems relative to the Trust's previous ones. As the majority of the 'new' systems offered only limited functionality, change either had a negative impact on the Trust's ability to engage clinical staff or was refused to avoid situations when technology dictates management needs and not a *visa versa*. In addition, serious problems with already deployed systems contributed to resistance from their own clinicians and through bad publicity scared the other ones working across NHS. There is also a number of reasons that various stakeholders have named out at different points of time and situations. First, by signing contracts centrally, the *Connecting for Health* have not taken account of the regional and local challenges and needs faced by the NHS; there was lack of senior management buy-in, trust's IT teams were not used as much as they could have been securing clinical buy-in along the way; an overall lack of engagement of clinical staff; lack of opportunities for NHS Trusts to influence the design of the care records systems and choice over which elements of functionality they wished to take in a deployment; lack of engagement with users and the fact that "hitting NHS Plan targets is necessary but not sufficient, unless translated into benefits for patients; changes must be made in the process of healthcare delivery through em-

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[260] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems". [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

powered and skilled change agents: if you employ new technology in an old organisation, all you get is an expensive old organisation" (Dr. Peter Homa, chief executive of St Georges Healthcare NHS Trust, England).

There is also plenty of evidence that there is a ***lack of local change ownership and commitment*** by the stakeholders and especially clinical staff. According to the Committee of Public Accounts[261], the establishment of a *Connecting for Health*, which procured systems centrally rather than locally, was driven by the Department's desire to address what had previously been a haphazard approach to IT procurement, to achieve value for money and to deliver integrated systems. Understanding that Programme's implementation has to be driven locally came much later. Following NAO report in 2006, in August the same year Chief Executives of 10 Strategic Health Authorities were appointed as Senior Responsible Owners for the implementation of the Programme and realisation of benefits for their part of the NHS. Furthermore in October 2006 the Department initiated the 'National Programme for IT Local Ownership Programme', to strengthen local ownership and governance and re-position the Programme as part of mainstream NHS business, and in April 2007 accountability for implementing the Programme formally transferred to the local NHS. Following this, NHS *Connecting for Health*, among other things, remained responsible for the contractual relationship with the Local Service Providers, though The Local Ownership Programme allowed the NHS a greater role in developing the systems and in the planning and timing of system deployments, working with the Local Service Providers.[262] A recent case of Pennine Care NHS Foundation Trust shows that there is still much to be done. The Trust has withdrawn from taking the Lorenzo electronic patient record system from local service provider CSC to consider other options in the market.[263] Pennine was meant to be the last of four 'early adopter' Trusts taking Lorenzo

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[261] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems". [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

[262] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems" [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

[263] E-Health Industry, 15 April 2011; Hoeksma, 2011.

from CSC, which would have enabled the CSC to meet belatedly contractual commitments and unlock milestone payments, but delays of the mental health functionality within Lorenzo pushed the Trust to withdraw from the Lorenzo Early Adopter Programme. Challenges of the practical development of local ownership in highly devolved NHS were also mentioned in NAO report.[264]

Throughout the entire process of the *Connecting for Health* implementation so far there was a persistent lack of real expectations and deadlines. One of the main objectives of the Programme was to deliver an integrated electronic care records system that would reduce reliance on paper files, make more accurate patient records available at all times, and enable rapid share of information between different parts of the NHS. However, the delivery of care records systems to support the creation of the Detailed Care Record has proven to be far more difficult than anticipated. At the outset of the Programme, the aim was for detailed care records systems to be delivered to all NHS trusts and GP practices by the end of 2007, with increased functionality and integration added before full implementation of electronic care records for every NHS patient was complete in 2010.

However every single report by the National Audit Office and Committee of Public Accounts ever since have been reporting on delays in software development and delivery, difficulties in implementing standard systems across the NHS with the date of the delivery and implementation of care records systems now being postponed up to 2015-16.[265] Even with reduced

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[264] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems". [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

[265] NAO (2006). Department of Health: The National Programme for IT in the NHS, Report by NAO. 16 June 2006 [accessed 03-09-2014]. <http://www.nao.org.uk/publications/0506/department_of_health_the_nati.aspx >.The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems" [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>. / Committee of Public Accounts, House of Commons. Department of Health: The National Programme for IT in the NHS, Twentieth Report of Session 2006–07 Report, together with formal minutes, oral and written evidence, HC 390 [Incorporating HC 1360-I of Session 2005-06]. Published on 11 April 2007 by authority of the House of Commons. London: The Stationery Office Limited, [accessed 03-09-2014]. <http://www.publications.parliament.uk/pa/ cm200607/cmselect/cmpubacc/390/390.pdf>.

number and functionality of systems being delivered, particular delays are observed in acute trusts, where only 10 of 97 systems have been delivered, and in mental health trusts where none of the 35 systems have been delivered so far.[266] For example, clinical benefits, such as the ability to electronically manage the prescribing and administration of drugs in hospitals, are expected to be delivered in later releases of the systems which are not yet available. Moreover, according to the same report, if progress by the Department of Health was measured against the original 23 aims of the Programme (which were changed by a so-called minimum specification level of functionality in 2008), the overall level of functionality provided to date was even lower and well below what the Department contracted for, although the cost of delivering care records systems remains substantially the same.

Among the new issues created by the situation were interim systems, which were delivered to trusts whose systems needed to be replaced urgently, but suppliers were not ready to deploy the systems of contracted functionality. These systems were not previously considered by the Health Department as meeting the aims of the Programme and under the terms of the current contract will need to be replaced in the future. However, who will do that and under what conditions are not known yet.[267]

An early reaction by the director of the Programme reflects an overall stance of the Programme towards the issues encountered for a long time. According to him, "we will get very soon to a point where they will either come good with what they've got, or they will get a bullet in the head".[268]

Programme's delays and inability to deliver were attributed to early decisions on the project: that contracts didn't pay much attention for what the NHS really needed, financial pressures on trusts made them reluctant to

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[266] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems". [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

[267] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems" [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

[268] The Private Eye, 6 March 2007.

commit to replacing their IT systems wholesale without any guarantee of improvement and the software simply wasn't up to the job.[269]

As a consequence, in September 2009, the Department announced that it was changing its approach to a more locally-led system allowing NHS organisations to introduce smaller, more manageable change in line with their local business requirements and capacity.[270] The Department no longer intends to replace systems wholesale and aims instead in some instances build on trusts' existing systems. However, as states recent NAO report[271], this also bears it is own challenges and risks: "with fewer systems being provided through the Programme and more use being made of a variety of existing systems, there is an increased risk of not achieving adequate compatibility across the NHS to effectively support joined up healthcare".[272]

There is plenty of evidence that suppliers were trying ***to hide their difficulties*** for as long as possible and for a variety of reasons including damage to their reputation or financial penalties and sanctions by the Programme.[273]

Being an ***'intelligent client'*** appears to be a particularly important factor in dealing with IT suppliers. A report suggested that there was a considerable lack of 'intelligence' by the *Connecting for Health* in England: "the US software bought in by BT and Fujitsu was proving unfit for purpose because it had been written for US healthcare systems. These were built around billing for the care and were unable to produce the data on which NHS management could depend on. The National Programme wasn't based on what the NHS needed, but what the big suppliers wanted to sell it".[274]

Contrary to what has been declared from the very beginning, ***the process*** was largely ***led by large IT suppliers*** than the needs of the NHS and

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[269] *Ibid.*

[270] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems" [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

[271] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems" [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

[272] *Ibid.*

[273] The Private Eye, 6 March 2007.

[274] The Private Eye, 6 March 2007.

those who would eventually use the systems. Although an initial declaration that "most of what we want to do has already been done somewhere, so we are talking about joining things up and rolling out best practices" was understood that the *Connecting for Health* will closely work with the NHS and widely use locally accumulated expertise and knowledge, the real actions signalled an entirely different approach. Examples include the way the procurement was organised and contracts awarded and the limited or, in fact, no role that stakeholders played in the development of the products although being legally forced to deployed unsuitable products later on.

According to Intellect, which represents more than 800 companies ranging from SMEs to multinationals and as a collective voice for its members drives connections with government and business and which recently provided industry body's response to the consultation on a new information strategy for the NHS[275], ***neglecting locally accumulated knowledge and skills*** and the need for their development may have resulted in Trusts' inability to delivered a new strategy: "the *Connecting for Health* in the NHS may have left some Trusts without the skills needed to deliver the transformation envisaged by the 'information revolution'".[276] Here the Trusts and other NHS organisations are expected to undertake a complex set of management and IT tasks, however "under the *Connecting for Health*, Trusts were not called upon to make what it might have been considered as risky ICT decisions and therefore lack the necessary experience and ability to make such decisions effectively and may lead to hesitancy in "undertaking the transformation that may be needed".[277] The report also stressed the importance to pay more attention to the profile and skills of NHS informatics teams or functions at the local level by uplifting and recognising them at board level. For instance, chief information officers should be included in executive management teams. It also said that the NHS as a whole needs to "value information and systems by demonstrating to staff that a larger

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[275] Department of Health. An Information Revolution: a consultation on proposals. Launch date: 18 October 2010. Closing date: 14 January 2011 [accessed 12-12-2014]. <http://www.dh.gov.uk/en/Consultations/ Liveconsultations/DH_120080>.

[276] e-Health Insider. NHS 'lacks skills' for info revolution, 13 January 2011. By Sarah Bruce, [accessed 03-09-2014]. <http://www.ehi.co.uk/news/ehi/6560/nhs_'lacks_skills'_for_info_revolutio>.

[277] *Ibid*.

proportion of spend on ICT is required, in addition to better information sharing, to deliver good quality care." It contends that the current percentage spend on information solutions does not reflect the value of information to the care process.

As a consequence, ***hindering NHS capabilities to innovate*** is another important outcome of the *Connecting for Health* centralised approach. In a recent report delivered by the NHS Confederation in 2011 NHS technology is criticised for being similar to the "pre-industrial handicraft industry" (NHS Confederation, 2011). The report blames the National Programme for IT in the NHS for creating scepticism about what technology can do for the health service. According to it, a combination of top-down initiatives and a lack of local of engagement have meant that many of them have failed to take off or continually failed. Therefore, many developers now see NHS IT as "stuck." Moreover, according to the report, many interviewees emphasised the frustration towards the "vast scale of the organisation, which has centralised much of its IT development to a few colossal contracts". Respondents also argued that skills, incentives for innovation and the leadership needed for local innovation had been hindered by the national programme. The highly centralised approach has meant that local organisations have been reluctant to experiment and invest in technology, in case it later turns out to be incompatible with some part of the nationally designed model.[278] The NHS Confederation, however, has praised recent government initiatives, such as the Information Revolution and the Liberating the NHS white paper for putting technology higher on the political agenda.[279] It also praises the government for "shifting away from the centralised model, which may allow for a greater degree of innovation."

Service integration towards patient-oriented healthcare delivery was declared among the main objectives of *Connecting for Health* in England. However, ***service fragmentation instead of cooperation*** was more often observed in the course of Programme's implementation. Observers men-

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[278] E-Health Insider, 24 January 2011. e-Health Insider. NPfIT failures have left NHS IT "stuck", 24 January 2011, by Sarah Bruce [accessed 03-09-2014]. <http://www.ehi.co.uk/news/EHI/6586/npfit-failureshave-left-nhs-it-"stuck" >.

[279] Department of Health. An Information Revolution: a consultation on proposals. Launch date: 18 October 2010. Closing date: 14 January 2011 [accessed 03-09-2014]. <http://www.dh.gov.uk/en/Consultations/ Liveconsultations/DH_120080>.

tioned that "under the government health reforms one hospital was pit against another".[280]

But the most significant shortcomings of the approach of the *Connecting for Health* are those related to ***IT failures hurting patient care***. For instance, in September 2006 an investigation revealed that 110 "major incidents", those at "severity one" defined as causing "a significant adverse impact on the delivery of patient care to a large number of end users; or significant financial loss and/or disruption" related to the *Connecting for Health*.[281] Most involved the collapse of systems to access electronic X-rays, but several compromised the patient administration of entire hospitals. Typical was the disappearance of data on 800 outpatient appointments during a software upgrade at Birmingham Children's hospital.[282] In July the same year the 80 Trusts across the West Midlands and North West that had installed suppliers' IT systems, including eight acute hospitals, were thrown into chaos when the company's data centre collapsed. As a result, more than half of them had to operate for several days without any of the administration systems.

Even greater disasters were soon to follow. For instance, at Nuffield Orthopaedic Centre (NOC) Fujitsu's software installation caused "a serious situation" urging a so-called "serious untoward incident" report to the National Patient Safety Agency. According to the Agency, problems included "inability to print patient invitation letters and incorrect schedules for patients who need to be seen by particular dates".[283] Operations were cancelled, and the board reported a "significant backlog of outpatient appointments", causing the Trust's three-star rating to be replaced by a "poor" label.[284]

Furthermore, nearly 300 incidents were reported have put patients at risk between 2005 and the middle of 2008 when health officials began systematic recording of safety matters under the NHS *Connecting for Health* at the same time mentioning that most major *Connecting for Health* systems

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[280] ComputerWeekly.com (07 November 2006). Trust feels pain of NHS IT roll-out [accessed 03-09-2014]. <http://www.computerweekly.com/Articles/2006/11/07/219625/Trust-feels-pain-of-NHS-IT-roll-out.htm>.

[281] The Private Eye, 6 March 2007.

[282] *Ibid*.

[283] BBC News, 14 March 2006.

[284] The Private Eye, 6 March 2007.

have yet to be rolled out.[285] According to observers, such cases illustrate the folly of the programme's over-centralised approach and the risks it continues to pose *(ibid.)*.

Moreover, the disproportional power of suppliers soon became abusive. Instead of the Programme demonstrating the value for money, it demonstrated no value for money. According to witness, already back in 2003 NHS Trust directors, who were looking to upgrade their IT, were "directed by the then Secretary of State to use the contracts under the National Programme for IT since these had been shown to demonstrate the best value for money" (The Private Eye, 6 March 2007). However, "the contracts, in fact, hadn't demonstrated anything by that stage; they hadn't even been signed. Trusts wouldn't be able to examine the companies' performance and decide whether to use them, as any intelligent customer might. The regional monopolies of BT, Accenture, CSC and Fujitsu were state enforced and unassailable" (*ibid.*). In cases where systems were installed, the suppliers were "not slow to turn the screw on their customers, the trusts". Evidence was starting to emerge that, for example, in primary care trusts of the companies charging around £5,000 to transfer data from old systems to new, compared to a price of half that before the National Programme contracts. A most recent NAO report has delivered a critical conclusion in this respect, which at the same time questions the purpose of the Programme. According to it, the Department of Health has significantly reduced the scope of the Programme without a proportionate reduction in costs and is in negotiations to reduce it further still. So we see a steady reduction in value delivered not matched by a reduction in costs. "On this basis we conclude that the £2.7 billion spent on care records systems so far does not represent value for money, and we do not find grounds for confidence that the remaining planned spend of £4.3 billion will be different".[286]

The table below summarises the key features of the approach of the national process of ICT implementation in NHS England. Analysis showed

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[285] ComputerWeekly.com, 25 April 2008. By Tony Collins on April 25, 2008, 290 patient safety incidents reported under NPfIT scheme [accessed 03-09-2014]. <http://www.computerweekly.com/blogs/public-sector/2008/04/290-patient-safety-incidents-r.html>.

[286] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems" [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

that there is plenty of evidence linking the approach towards ICT deployment in the healthcare sector in England and the actual obstacles being encountered. The advantage of a longitudinal case study is the ability to observe the developments as they progress and enables not only to do better predictions but also see how they are tested by time.

Numbers of today's actions are suggesting that the approach had considerable shortcomings. For instance, early signs appeared in 2009 that the approach of the *Connecting for Health* should be changed into more 'modular and locally-led'.[287]

At the beginning of 2011 high-level discussions were started in relation to the need to create an open market in health IT systems. In a keynote speech at Health Conference in Birmingham in 2011, the Health secretary Andrew Lansley said that getting the Department of Health "to award multi-billion pound contracts "didn't work" and weighed heavily against innovation".[288] To replace this approach, he promised that a broad range of hospitals, GPs, and other providers would be able to "choose from a whole range of hardware and software". Moreover, the new approach will be aiming to "connect all" and "empower hospitals, GPs and a whole range of other providers to become customers and equip them with the resources to choose from a whole range of hardware and software". The Minister also said that although NHS *Connecting for Health* is still being funded, there won't be no further, separate, national NHS IT investments in the nearest future as "digital" needs to be embedded in the mainstream of the health service".[289]

Another trend of changes was moving from a 'replace all' to a 'connect all' approach to IT. This was announced by the NHS director general of informatics in 2010. Asked how this approach would work while the na-

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[287] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems" [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

[288] e-Heath Insider Industry. Lansley to open up health IT market, 5 April 2011. By Jon Hoeksma[accessed 12-12-2014]. <http://www.ehi.co.uk/news/industry/6779/lansley_to_open_up_health_it_market>.

[289] e-Heath Insider Industry. Lansley to open up health IT market, 5 April 2011. By Jon Hoeksma [accessed 03-09-2014]. <http://www.ehi.co.uk/news/industry/6779/lansley_to_open_up_health_it_market>.

tionally negotiated contracts for electronic care record systems were still in place, the Minister said that she hopes Trusts will choose systems that they are already contractually committed to. But the Ministry is committed to an environment where trusts have a choice." Moreover, Trusts who do not want to use the products of local service providers would not be forced to do so: "I want to see trusts committed to upping the quality of the systems they run; until we get better systems in place, we will not see the improvements we need to make".[290] NHS informatics community will be approached for guidance on the interoperability standards to mandate and the approach to take.

The "*visualisation*" of "*the English approach*"

By analysing a national process of ICT implementation in the healthcare sector in England, the stakeholder engagement came up as a cross-cutting factor (**Figure 2.1**). For instance, in relation to the overall approach taken by the *Connecting for Health* in England, was not a bottom-up, as it was initially expected and which would have created spaces for working with clinicians and the service, but top-down, which meant that the service and the future systems' users were excluded from the process from its very beginning (e.g. procurement stage) through the entire process (such as the development and deployment of the information systems). Moreover by giving relatively large powers to suppliers, the service was legally bound to accept not suitable IS. Criticism of a technocratic view towards the change also had references to stakeholder engagement. Conclusions were made that the focus of health IT in the NHS was on technical delivery of the IT, not managing the organisational change and the multitude of stakeholders. This was partly attributed to the role of IT suppliers and associated management consultants' role they played in advising the government and therefore having control both on the programme and its operational delivery. Big bang' approach and 'rip and replace' strategy were also seen as tightly related to the role that the users and other stakeholders are allowed to play in the process. Critics suggested that both the approach and the strategy were not suitable in overall where fundamental changes in the way people work were required to take place.

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[290] e-Health Insider. Connelly: NHS IT to 'evolve', 10 November 2010. By EHI staff [accessed 03-09-2011]. <http://www.ehi.co.uk/news/ehi/6406>.

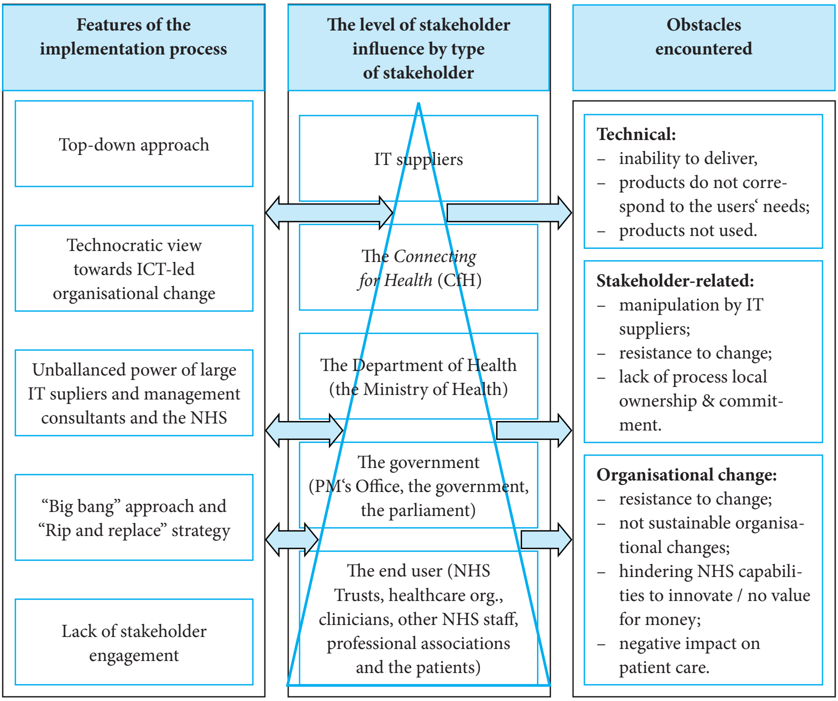

Figure 2.1. National process of ICT implementation in England

Source: Rasa Rotomskiene (2011), Doctoral Dissertation. Innovation and Sustainability in the Implementation of eHealth: an International Perspective on the Role of Stakeholders.

Major obstacles that were encountered by the programme also had direct or indirect references to the engagement of users and the service. Delivered systems were difficult or not possible to use by those they were intended for as they were not involved in the process and were not able to communicate their needs in some other ways, there was a resistance to change and lack of local change ownership and commitment, which resulted in Trust withdrawing from the early adopters' arrangements, scaring the rest of the service and jeopardising the implementation of the whole Programme. Lack of real expectations and deadlines were also partly attributed to the fact that the ICT-led change was only emphasising a so-called 'hard' / 'mechanistic' part of it, with no attention paid to 'softer' / human-related aspects. The fact that the process was led by large IT companies rather than the real needs of the service, hindered conditions to become an 'intelligent client and had an impact on neglecting locally accumulated knowledge and skills and NHS' capabilities to innovate. As showed the results of the case study of the national process of ICT *Connecting for Health* in England. Furthermore, stakeholder reactions seemed to have direct implications for the decisions whether the systems will be used or not. Empirical evidence suggest that among the other stakeholder groups, such as the Programme, IT suppliers or the government, the end users, their associations and the service as a whole are among the most important for the changes actually to take place at the workplace level. Referring back to the literature, user participation in software development is beneficial because it improves the requirements determination process, leads to greater buy-in, and keeps users informed about progress leading to higher levels of user satisfaction, system quality, and system usage.[291] However, it is dangerous to assume that user participation always leads to successful project outcomes. The fact that "ticking the box marked "users consulted" in the procurement process" was not an appropriate way of engaging stakeholders, there is a question of what is the level of stakeholder engagement to make their worthwhile contribution to the national process of ICT implementation in health and which level is not satisfactory.

Taking Friedman & Miles ladder of stakeholder management and engagement, which is based on Arnstein's ladder of participation[292] (**Figure 2.2**), the English approach could be placed only on the lower levels of the ladder (two first levels of the ladder), using manipulation and therapy as a stakeholder management tool at least until about the end of 2008, when Richard Granger, the director of *Connecting for Health,* has left the Programme. As provided empirical evidence suggest, the main intention of 'engagement' in the very beginning was to mislead stakeholders, attempting to change stakeholder expectations or 'cure' stakeholders of their ignorance and preconceived beliefs. According to Friedman & Miles, they do not advocate that all stakeholder relations be conducted at the highest level (Level

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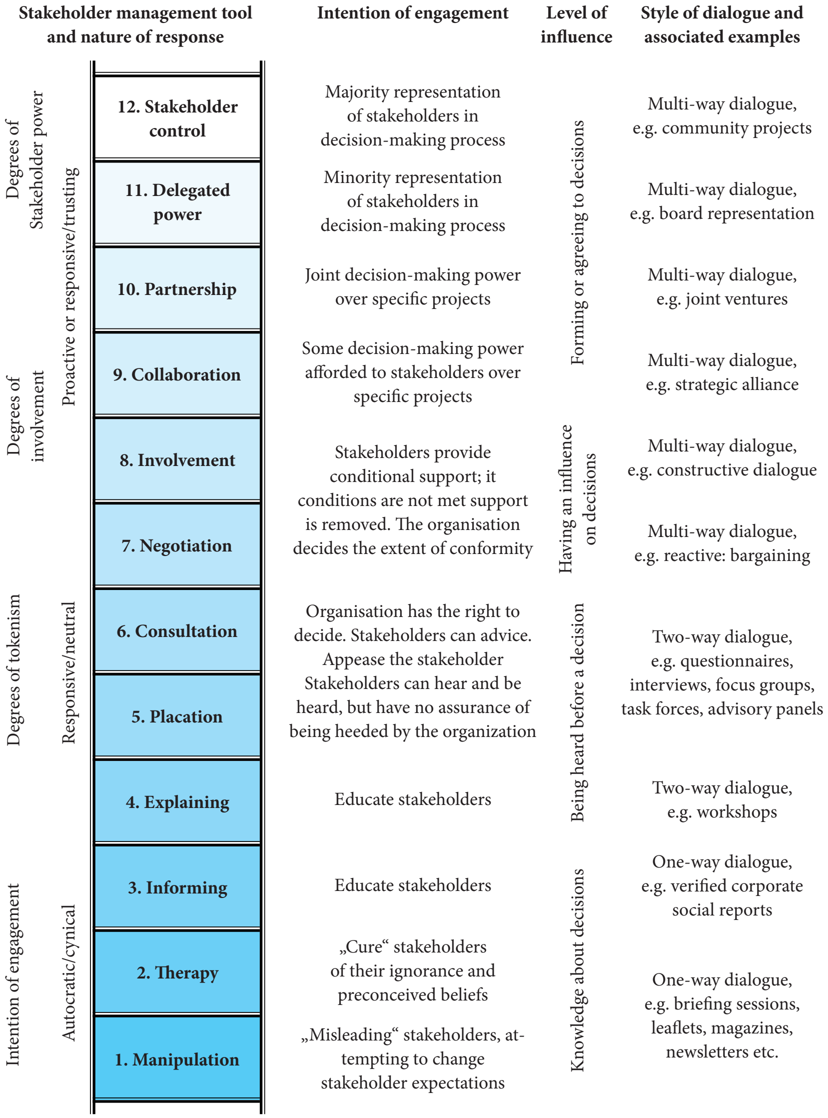
[291] Gallivan & Keil (2003). The user–developer communication process: a critical case study. Information Systems Journal. Vol. 13, Issue 1. p. 37-68, January 2003.

[292] Friedman, A.L. & Miles, S. (2006), Stakeholders: Theory and Practice. p. 162.



		Stakeholder management tool and nature of response	Intention of engagement	Level of influence	Style of dialogue and associated examples
Degrees of Stakeholder power	Proactive or responsive/trusting	12. Stakeholder control	Majority representation of stakeholders in decision-making process	Forming or agreeing to decisions	Multi-way dialogue, e.g. community projects
		11. Delegated power	Minority representation of stakeholders in decision-making process		Multi-way dialogue, e.g. board representation
		10. Partnership	Joint decision-making power over specific projects		Multi-way dialogue, e.g. joint ventures
Degrees of involvement		9. Collaboration	Some decision-making power afforded to stakeholders over specific projects		Multi-way dialogue, e.g. strategic alliance
		8. Involvement	Stakeholders provide conditional support; it conditions are not met support is removed. The organisation decides the extent of conformity	Having an influence on decisions	Multi-way dialogue, e.g. constructive dialogue
		7. Negotiation			Multi-way dialogue, e.g. reactive: bargaining
Degrees of tokenism	Responsive/neutral	6. Consultation	Organisation has the right to decide. Stakeholders can advice. Appease the stakeholder Stakeholders can hear and be heard, but have no assurance of being heeded by the organization	Being heard before a decision	Two-way dialogue, e.g. questionnaires, interviews, focus groups, task forces, advisory panels
		5. Placation			
		4. Explaining	Educate stakeholders		Two-way dialogue, e.g. workshops
Intention of engagement	Autocratic/cynical	3. Informing	Educate stakeholders	Knowledge about decisions	One-way dialogue, e.g. verified corporate social reports
		2. Therapy	„Cure“ stakeholders of their ignorance and preconceived beliefs		One-way dialogue, e.g. briefing sessions, leaflets, magazines, newsletters etc.
		1. Manipulation	„Misleading“ stakeholders, attempting to change stakeholder expectations		

Figure 2.2. The English approach on the ladder of stakeholder management and engagement (adopted from Friedman & Miles, 2006: 162)

Source: Rasa Rotomskiene (2011), Doctoral Dissertation. Innovation and Sustainability in the Implementation of eHealth: an International Perspective on the Role of Stakeholders.

12), or at any particular level, but levels 1 and 2 represent bad practice and if organisations either neglect important stakeholders or treat them with contempt, this will hurt the organisation in the long run in terms of its reputation and ultimately its sustainability.[293]

As we have seen, stakeholders were complaining that the *Connecting for Health* merely informed them even about decisions that have already taken place, to say nothing about an advanced information giving. The style of management was autocratic and did not involve any form of participation in the organisation and certain groups of stakeholders namely the users and the service as a whole. Moreover, the English approach had some features that Friedman & Miles described as cynical, but common for the lower two rugs of stakeholder management and engagement ladder.[294] Here attempts were contrived to appear to be indicative of true participation, but, in fact, were mere PR attempts at changing stakeholder expectations. The power was firmly on the side of the *Connecting for Health along* with IT suppliers and associated management consultants, but not the NHS. There was no dialogue, merely a one-way communication process blended with features of manipulation such as control, skilful management, and manoeuvring of opinion. Friedman & Miles a similar situation call "PR management", which exists to enable power-holders to educate or cure, not to enable participants in planning or delivering the initiatives. There were also attempts to stakeholder brainwashing – a feature that is typical for the therapy rug in the stakeholder management and engagement ladder. Stakeholders were intensively attacked with self-laudatory corporate information. However, contrary to the expectations, clinicians and the NHS was a stakeholder group, which was difficult to 'indoctrinate' with the principles the *Connecting for Health* along was keen to manipulate with.

The changes that have started in 2009 provide an indication that the approach towards stakeholder engagement may change, but for a number of years have not reached a higher level than the first rung of tokenism – informing – in the Arntein's ladder of participation / Friedman & Miles' ladder of stakeholder management and engagement. For instance, in 2008 clinicians and other NHS staff were asked to provide examples of how NHS CfH has improved its approach towards the service. Examples of improve-

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[293] Friedman, A.L. & Miles, S. (2006), Stakeholders: Theory and Practice. p. 162-163.

[294] *Ibid.*

ments that were suggested by the NHS included more open communications from NHS *Connecting for Health* and providing clinicians with more advance notice of events to make it easier for them to attend (NAO, 2008). Although current developments suggest considerable improvements in this respect, it is unlikely that the approach of the Connecting for Health towards stakeholder engagement will exceed the highest level of tokenism in the ladder of stakeholder management and engagement, which is consultation[295] In overall token engagement allows the 'powerless' to have a voice, but they lack the power to ensure their voices are heeded. Explaining, placation and consultation are distinguished as three rungs in the stakeholder management and engagement ladder at tokenism level[296] (scheme No. 2). The next rungs up (Level 7: negotiation and Level 8: involvement) seemed to be already too high to describe the situation of the *Connecting for Health* in England until the very end of its existence. The approach was difficult to change as this kind of process takes time, requires dedication and skills and most importantly the vision on how to drive the process. For instance, according to the Friedman & Miles' module (Scheme 2), at the negotiation run, negotiation have to occur before reaching a final decision. Involvement, however, is positioned above negotiation because the balance of power is less extreme, and the goals are less divergent. Roundtables here have a degree of decision-making power, which is afforded in advance, because members are expected to draft proposals, rather than just provide ad hoc advice or recommendations, as is the case with focus groups or advisory panels.[297] There is little indication that this was happening before 2008 as well as later on. For instance, NAO report reveals that the majority of Trusts that auditors have visited in preparation of the report, had involved clinicians on their project boards and "in one Trust the deployment had been led jointly by the Chief Executive and the Director of Nursing".[298] However, no details were given about the content of the contribution stakeholders provided or how exactly it was used. Other statements indicated that Trusts

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[295] Friedman, A.L. & Miles, S. (2006), Stakeholders: Theory and Practice. p. 162-163.

[296] *Ibid.*

[297] *Ibid.*

[298] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems" [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

were making considerable efforts in making the deployment process as smooth as possible, despite the limited role they were allowed to play in the process. According to the report[299], Trust were mapping their work processes prior to the deployment to identify "how best to train staff in the new system and allow remodelling of work processes to spread good practice and make them more consistent across the Trusts". At the same time they also recognised that they should have done more work to map processes, which "would have identified more potential pitfalls and reduced problems or brought earlier benefits after the deployment", because "in some cases staff were devising workarounds to make the system work with their processes in the way previously customised systems had", and almost all Trusts "needed to do additional work subsequently to make sure that staff were using the new system as intended". Being able to cross and compare with the developments in Wales, one aspect is of particular importance here – all reports are talking about the ability for Trusts to contribute to the deployment process at best, but not the systems' development processes. This type of approach is usually called after-the-fact approach, whereby technology, as a result, starts dictating management needs because stakeholders were not given an opportunity to communicate their needs and requirements much earlier in the process. Evidence suggests that this is among the main reasons that many projects fail. Technology is not the cause, nor will it solve an organisation's problems, it must instead, support and not attempt to drive the mission of the NHS.

Later developments do provide an indication of the role that was projected for various types of stakeholders in relation to the *Connecting for Health* to 'increase local ownership' of the Programme. For instance, the appointment of Chief Executives as 'senior responsible owners' in 10 Strategic Health Authorities and Chief Information Officers to support them in their role by the Department of Health, adoption of the "National Programme for IT Local Ownership Programme" and the developments around formal transferring of the accountability for implementing the Programme to the local level. These were accompanied by other actions, including a 'comprehensive operating model' developed by the Department of Health to take into account 'the revised responsibilities and gov-

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[299] *Ibid.*

ernance arrangements in delivering the *Connecting for Health*". Steps were also taken 'to boost capacity and capability' by transferring 200 staff and contractors from NHS CfH to the Strategic Health Authorities. Part of funding was also transferred to the Strategic Health Authorities (according to the NAO report, this was around £25.5 million in 2007-08 and £30 million a year from 2008-09). The Local Ownership Programme allowed the NHS a greater role in developing the systems and in the planning and timing of system deployments, working with the Local Service Providers. To close the gap between the Local Service Providers and the Strategic Health Authorities, three working groups were formed reflecting regional developments – London (where there is one Authority), the South (three Authorities), and the North, Midlands and East (six Authorities). Each group established a Management Board, responsible for coordinating and overseeing the Programme in their area and appointed a Programme Director to work with the Strategic Health Authorities' Chief Information Officers.

Regarding stakeholder reactions, NHS staff was positive towards the Programme as well as their professional associations. According to them, Local Ownership Programme had the potential to enhance engagement at the local level. However, thy also stressed that, for the benefits to be realised, it was important for the Strategic Health Authorities and Trusts to have the necessary authority and expertise to fulfil their new role and to ensure that in practice, as intended by the operating model and that roles were clear and not duplicated.[300]

At the same time report also mentioned that in the highly devolved NHS, however, the practical reality for the Strategic Health Authorities' accountability in their areas – and for the NHS Chief Executive as the Senior Responsible Owner for the Programme as a whole – is far from straightforward.[301] For example, while the Strategic Health Authorities can suggest a timetable for future deployments, in practice decisions about when a new care records system should be deployed lie with Trust Boards and their

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[300] The National Audit Office, 18 May, 2011. Report on "The National Programme for IT in the NHS: An Update on the delivery of Detailed Care Records Systems" [accessed 12-12-2014]. <http://www.nao.org.uk/report/the-national-programme-for-it-in-the-nhs-an-update-on-the-delivery-of-detailed-care-records-systems/>.

[301] *Ibid.*

Chief Executives, taking account of the implications for patient care and safety and the efficient and effective running of their Trust.

Moreover, NHS CfH remained responsible for the contractual relationship with the Local Service Providers, though the Strategic Health Authorities now have access to the finance and commercial sections of the contracts.

From the perspective of Arntein's ladder of participation / Friedman & Miles' (2006) ladder of stakeholder management and engagement, this approach looked yet a bit too formal and unattached from the grassroots level. Within this context stakeholder engagement and management in England in relation to *Connecting for Health* is unlikely to pass the rungs of explaining, placation, and consultation of the Friedman & Miles' theoretical model today and in the nearest future. The rugs are mainly explained by workshops, which aim to inform stakeholders about the decisions already taken, but with little room for stakeholders' opinion to actually influence the decision being made; by lack of trust and not sufficient participation to develop a sense of ownership of the ideas and processes; also advisory panels, task forces, and focus groups, which involve two-way dialogue prior to a decision being made and provide an opportunity for stakeholders to influence the eventual outcome, yet they do not generate proposals and the organisation has the continued right to decide upon its actions.[302] Such methods of stakeholder management can offer a degree of legitimacy and independence to the strategic outcome; however attention should be paid to the potential problems associated with task forces, focus groups, roundtables, and advisory panels. It should be noted that some organisations would only pay lip service to such engagement. The issue of representation is also very important: the way the stakeholders are selected; the mechanisms to ensure those that should be heard have a voice; the way the agenda is set; and the representation of various groups, where multi-stakeholder negotiations may not be the best solution for disadvantaged groups due to hidden abuses of power that tend to exaggerate the level of consensus reached, and expose disadvantaged groups to greater manipulation and control by more powerful stakeholders.

In-depth analyses of a respective process in Wales shows a completely different approach and results.

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[302] Friedman, A.L. & Miles, S. (2006), Stakeholders: Theory and Practice. p. 170.

2.1.2. National Process of ICT Implementation in Healthcare Sector in Wales

Key features of the implementation process

Informing Healthcare is a Welsh Assembly Government programme (a national coordinating body for eHealth development in Wales) and was set up to improve health services in Wales by introducing new ways of accessing, using and storing information. It was set up in 2003 and is one of the key enablers for Designed for Life, the national strategy to deliver world-class health and social care for Wales. In 2010 it has merged with other four strategic organisations in Wales (Health Solutions Wales, Business Services Centre Information Management and Technology element, Corporate Health Information Programme and Primary Care Informatics Programme) to establish the NHS Wales Informatics Service responsible for an overall strategic development of ICT, the delivery of operational ICT services and information management in Wales.

Regarding the implementation features of the national eHealth programme in Wales, *Informing Healthcare* was aiming to introduce new processes through incremental service improvement projects in full co-operation and partnership with clinicians, local health communities, patients and the public (**Figure 2.3**). Among the key features of the Welsh approach are as follow:

- A bottom-up incremental change implementation approach, where the national programme (the national coordinating body) works as a change management organisation providing a platform for stakeholder cooperation;
- Multi-level organisational communication with the NHS Wales and stakeholder engagement,
- An extensive involvement of end users in the delivery of service improvement projects (path-finder pilot projects);
- Close working with IT suppliers;
- Considerable attention paid to the further development of ICT experience and competence of the NHS Wales.

As a result, the *Informing Healthcare* is delivering information systems that are suitable for using, it has considerably increased internal cooperation among NHS organisations in Wales, due to the Programme's efforts

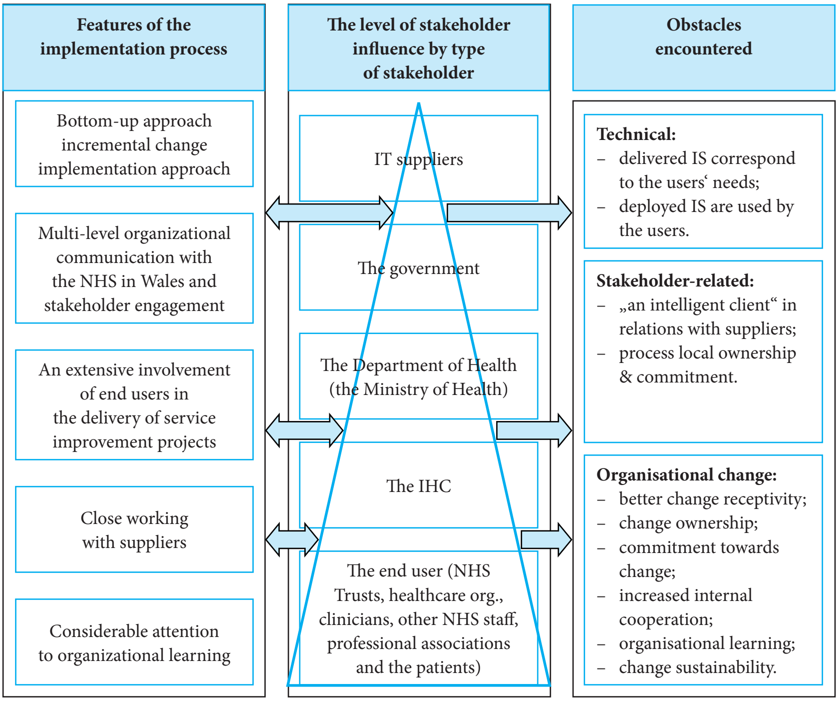

Figure 2.3. National process of ICT implementation in Wales

Source: Rasa Rotomskiene (2011), Doctoral Dissertation. Innovation and Sustainability in the Implementation of eHealth: an International Perspective on the Role of Stakeholders.

there was information and knowledge accumulated, which gradually is enabling to become an intelligent client and therefore lower an overall dependency on IT suppliers. The approach has also helped to achieve more sustainable changes in work organisation because of stakeholders' commitment to change and also to achieve an overall value for money. This becomes even more important knowing that among the main obstacles that were encountered in relation to the ICT in healthcare sector in Wales were information systems, which were unable to facilitate patient information sharing among the healthcare providers, because of technical incompatibility; lack of power in dealing with IT suppliers, where individual healthcare providers were too weak to deal with IT companies on their and related challenges such as difficulties to choose the IT products, negotiate better prices and an overall fear that private IT companies "will get lead on you" with all undesired consequences following later; also there was a lack of a "bigger picture", which often prevented inter-organisational cooperation among Trusts.

Stakeholder (and in particularly the user) engagement was the feature that seemed to be playing the most important role in this situation. Regarding the levels of stakeholder engagement and management identified by Friedman & Miles[303], levels 9 (collaboration) – 11 (delegated power) seemed to be most suitable for the engagement of end users in the national process of eHealth development, where degrees of involvement / degrees of stakeholder power were varying from proactive to trusting, intention of engagement was varying from affording some decision-making authority to stakeholders over specific projects to minority representation of stakeholders in decision-making process; level of stakeholder influence forming and agreeing to decisions and with multi-way dialogue varying from strategic alliances to board representation (**Figure 2.4**). Meanwhile, IT suppliers have to be involved in a way they could be tightly management by the coordinator of the national process (for instance, a national programme).

2.2. The strength of the "Welsh approach": linking stakeholder engagement to process success factors

In-depth analysis of the Welsh approach has revealed that stakeholder engagement has considerably contributed to the change communication, change receptivity, change ownership and commitment towards change, internal cooperation, to the crossing of organisational boundaries, organisational learning and overall quality of patient care and change sustainability.

Stakeholder engagement and change communication

The Welsh case study has once again confirmed the importance of stakeholder engagement for improving communications. Stakeholder engagement may improve the quality and depth of the communication, such as open up new communication channels and improve the outcomes of existing ones; however certain conditions have to be met. Among the key find-

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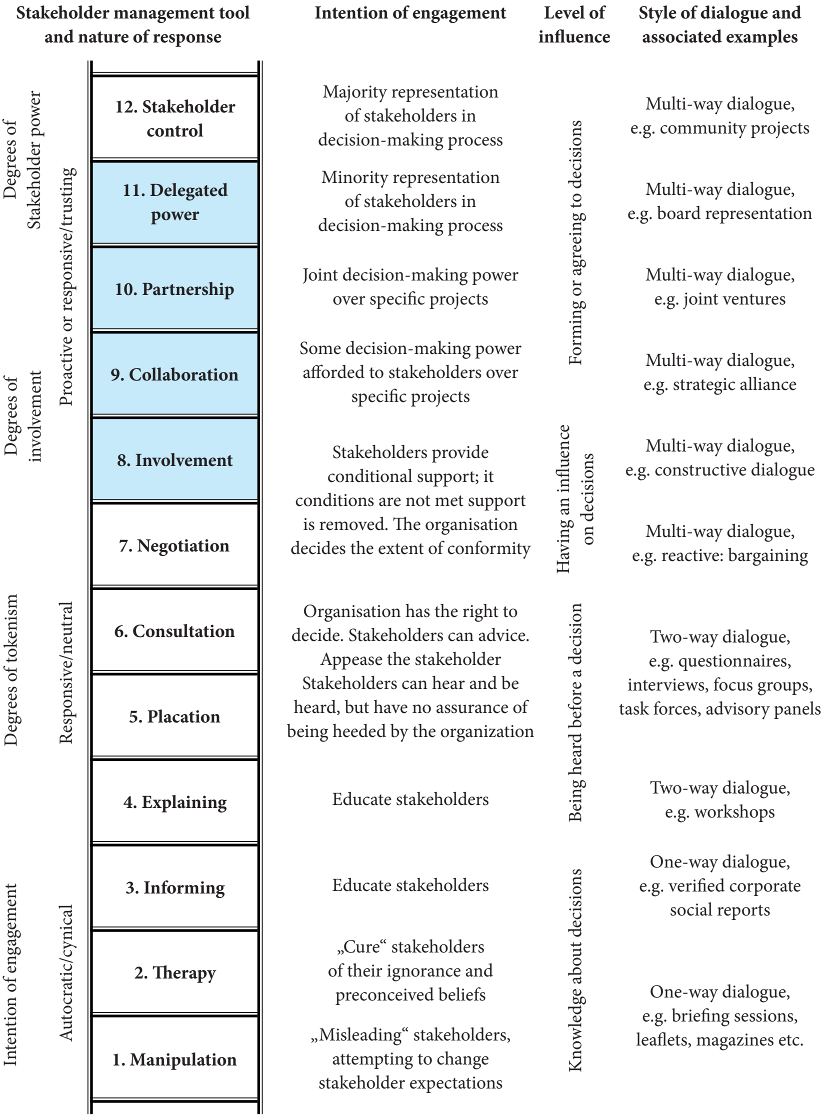
[303] Friedman, A.L. & Miles, S. (2006), Stakeholders: Theory and Practice. p. 162-163.



Stakeholder management tool and nature of response			Intention of engagement	Level of influence	Style of dialogue and associated examples
Degrees of Stakeholder power	Proactive or responsive/trusting	**12. Stakeholder control**	Majority representation of stakeholders in decision-making process	Forming or agreeing to decisions	Multi-way dialogue, e.g. community projects
		11. Delegated power	Minority representation of stakeholders in decision-making process		Multi-way dialogue, e.g. board representation
		10. Partnership	Joint decision-making power over specific projects		Multi-way dialogue, e.g. joint ventures
Degrees of involvement		**9. Collaboration**	Some decision-making power afforded to stakeholders over specific projects		Multi-way dialogue, e.g. strategic alliance
		8. Involvement	Stakeholders provide conditional support; it conditions are not met support is removed. The organisation decides the extent of conformity	Having an influence on decisions	Multi-way dialogue, e.g. constructive dialogue
		7. Negotiation			Multi-way dialogue, e.g. reactive: bargaining
Degrees of tokenism	Responsive/neutral	**6. Consultation**	Organisation has the right to decide. Stakeholders can advice.	Being heard before a decision	Two-way dialogue, e.g. questionnaires, interviews, focus groups, task forces, advisory panels
		5. Placation	Appease the stakeholder Stakeholders can hear and be heard, but have no assurance of being heeded by the organization		
		4. Explaining	Educate stakeholders		Two-way dialogue, e.g. workshops
Intention of engagement	Autocratic/cynical	**3. Informing**	Educate stakeholders	Knowledge about decisions	One-way dialogue, e.g. verified corporate social reports
		2. Therapy	„Cure“ stakeholders of their ignorance and preconceived beliefs		One-way dialogue, e.g. briefing sessions, leaflets, magazines etc.
		1. Manipulation	„Misleading“ stakeholders, attempting to change stakeholder expectations		

Figure 2.4. The Welsh approach on the ladder of stakeholder management and engagement (adopted from Friedman & Miles, 2006: 162)

ings on this aspect was the insight that communications have to take place through multi-level stakeholder engagement across the levels, roles, and positions of the operational NHS organisation if change communication to be successful. At the Programme level the involvement of senior clinical staff at the director level (such as medical director, a national nursing lead or pharmacist), which were well respected personalities in their professional communities and networks, but also very interested in health IT, gave the Programme the additional credibility among the various groups of NHS staff, professional insights throughout the full spectrum of the Programme implementation streams and directions (starting from designing of the implementation strategy, managing the relations with certain parts and groups of the NHS etc., providing additional strategic support to managers of the national service improvement projects etc.) and guidance and strategic support for service improvement projects etc. This insight is also in line with the conclusions by Shortell that physician involvement in governance may not only improve communication among physicians, managers, and boards but also build trust by assuring clinical staff that their professional values and goals are represented in policy decisions[304]. It also confirms the remark made by Guthrie saying that in healthcare sector clinical staff is usually seen as the only professionals "legitimately" permitted to implement changes in relation to better medical care[305]. Another very important feature of the "Welsh approach" in relation to communication at the senior managerial level was raising the profile of the traditionally under-represented professional groups, such as nursing, with historically established professional boundaries between the doctors and nurses, patients, which in some countries and in general are too spread to communicate their positions and views in an efficient way and therefore not always heard in a decision-making process and the health informatics practitioners, without clear professional identity and therefore usually with diverse backgrounds and high amateur interest in health IT as in the case of Wales. As observed from a longitudinal perspective, this was enthusiastically met by those communities both from the psychological point of view to be rep-

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[304] Shortell, S. M. Effective Hospital-Physician Relationships. Chicago: Health Administration, Press. 1991.

[305] Guthrie M. Engaging physicians in performance improvement. American Journal of Medical Quality 20, 2005, p. 235-238.

resented and heard, but also because their requirements for the information systems will be taken into account. This concern has its own basis and reasoning because it is recognised that although most work in the healthcare sector is collaborative, large-scale ICT systems are often poor at supporting the collaborative dimensions of work[306]. Moreover, a large number of health developed information systems actually fail in supporting various healthcare professionals in their work[307].

As the national Programme involves several "layers" of change, it is also important to engage senior management at the Trusts' level. The national Programme needs not only local acceptance but also local resources to deliver it, such as co-funding but more importantly human capacity and commitment to delivering the changes at every organisational level. In this case, the tacit knowledge, that healthcare service providers have, become their specific assets, which are difficult, if not impossible to imitate[308]. Here some of the resources that the Programme needs are directly based on the relationships it creates with other organisations[309] and, therefore, the availability of them may change if the relationships among participants in the field change[310]. On the other hand, they also may or may not become the 'visible change agents' that are influencing the perceptions of change by the rest of the organisation and therefore are very useful to have "on board".

However, communication and engagement at the senior organisation management levels, although very important, are not sufficient for changes to take place "on the ground" as they have different objectives and roles. According to number of authors, employee's level in the organisational hierarchy, with its corresponding responsibility and authority, may be a critical influence on sense making outcomes in relation to organisational change, therefore communication reaching this level is of crucial importance[311].

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[306] Scandurra I., Hagglund M., Koch S. From user needs to system specifications: Multidisciplinary thematic seminars as a collaborative design method for development of health information systems. Journal og Biomedical Informatics, 2008, Vol. 41, 557 569.

[307] *Ibid.*

[308] Feldman M.S. Resources in Emerging Structures and Processes of Change. Organisation Science, May-June 2004, Vol. 15, No. 3, 295 309.

[309] Eisenhardt and Schoonhoven, 1996.

[310] Feldman M.S. Resources in Emerging Structures and Processes of Change. Organization Science, May-June 2004, Vol. 15, No. 3, 295 309.

[311] Coyle-Shapiro J.A.M. Employee participation and assessment of an organizational change

In the Welsh case, the Programme took this well into account by the operational involvement of NHS staff into the national service improvement projects and by the development and supporting and empowering of the local delivery teams. Therefore, direct communication through involvement in the operational delivery is another main feature and particularity of the Welsh approach. Each service improvement project had a project board and core project delivery teams, involving people with clinical backgrounds and part-time participation of the NHS staff. Consisting of diverse specialists, communication has enabled mutual learning throughout the entire process of the project implementation. However, the initial phase when an inter-disciplinary project teams were facilitating so-called feasibility (project planning) seminars involving variety of specialists and positions from the NHS, was of ultimate importance for setting a common ground for the work to be taken forward. This also corresponds to the findings by Scandurra, that the development of health information systems, assuring that healthcare professionals of all disciplines involved are provided with information they actually need in their various work situations, requires, as a first step, establishment of a common understanding, or common ground, within the work team[312]. Small inter-disciplinary local support groups of the national service improvement projects were formed from local NHS employees to take forward the developments at the organisational level and to facilitate proximate communication with broader staff groups. To ensure direct communication with the local "grassroots' " level of the NHS, the Programme has established a network of so-called Programme's local managers in each Trust. With the responsibility for managing the delivery of the national service improvement projects, their salary was paid by the Programme, but they were part of NHS' health informatics teams within each Trust. From research observations, this was of particular success in terms of Programme's constant contact and ability to communicate directly with the local level of the NHS, because it showed

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intervention: A three-wave study of total quality management. Journal of Applied Behavioral Science, 1999, 35, p. 439-456 and Weber P.S., Manning M.R. Cause Maps, Sensemaking, and Planned Organizational Change. The Journal of Applied Behavioral Science, 2001, Vol. 37, No. 2, 227 251.

[312] Scandurra I., Hagglund M., Koch S. From user needs to system specifications: Multidisciplinary thematic seminars as a collaborative design method for development of health information systems. Journal og Biomedical Informatics, 2008, Vol. 41, 557 569.

Programme's commitment towards technology-led organisational changes at the local level and especially its commitment to empowering the local level for these changes.

However, the organisational context was found as being imperative in terms of effectiveness the local teams with IHC local managers may achieve. In addition to excellent communication and interpersonal skills, the effectiveness of the work of the person in charge, and in this case, the IHC's local manager in Trusts, was partly dependent on the presence and quality of formal and indeed informal internal communication lines and arrangements (such as formal meetings etc.). The ability to participate in so called "clinical meetings" (/ strategic meetings) was emphasised as especially important for the local IHC managers. Moreover, as the implementation of health information systems is very complex and requires considerable financial and other resources as well as possible disruption in workflows, participation and a joint decision by top managers of the organisation is necessary.

Another aspect, which was found being important in relation to the local IHC's manager position within Trusts was actually the aspect, if established internal formal communication arrangements were workable or not and the effectiveness of informal communication. For instance, in one Trust a local IHC's manager has its own office and formally was well placed within a range of formal communication arrangements, however, had no power to influence decision-making process; the one in another Trust was placed on the IT team, but had access to formal and informal so-called "clinical futures" strategic meetings at the Trust level, where strategic organisational changes are being planned and resources allocated.

As recalled by the local IHC project manager, multi-level stakeholder engagement and communication is necessary to convey the change message throughout the entire organisation. Communication as such, however, is "a self-perpetuating thing". According to one interviewee, "the more you pull on people, the more they know, the more they know, the more they understand, the more they understand, the more they want to be involved. So it's a circular thing". It is important to start communications as early as possible as it is a time-consuming process and hard in the beginning, but most importantly not to lose the momentum.

Stakeholder engagement and change receptivity

Receptivity of employees to organisational change is an emerging and significant issue for those involved in creating successful change implementation strategies[313]. According to the same authors, avoiding problems associated with change fatigue and change resistance are important considerations given ongoing agendas for change in contemporary organisations.

Stakeholder participation and receptivity towards technology-led organisational change were found as an important positive link within the context of the Welsh case study. Moreover the case also provided further evidence supporting the findings of Ford et al. saying that resistance has to be understood as socially constructed reality in which people are responding more to the background conversations in which the change is being initiated than to the change itself and changing the background requires dialogue to bring background constructions, such as assumptions, conclusions, decisions, etc., into the foreground so that they can be examined and altered through conversations, if necessary[314]. Only when the background conversation shifts, the foundation on which people construct their understanding of the world shifts too, and only then they can feel, think, and behave in new ways *(ibid.)*. Within such context, particular attention is given to dialogue and circumstances to facilitate it as the enabler to change entrenched perceptions and understandings.

This was very evident in the case of the Welsh approach to ICT implementation in NHS Wales. In addition to smaller alternations, the biggest "shifts" that had to take place before any changes could be initiated and the more so achieved were related to orientation to the national level (enable to share patient information nationally) instead of organisational level only, to work more collaborative across organisational and professional boundaries and to look from the patient perspective rather than the one of healthcare providers etc. According to the Programme, they knew and they were prepared for the fact that clinicians, in general, are more sceptical towards change than others, moreover it is likely that in a constantly changing le-

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[313] Frahm J., Brown K. First steps: linking change communication to change receptivity. Journal of Organizational Change Management, 2007, Vol. 20, No. 3, 370 387.

[314] Ford J.D., Ford L.W. The role of conversations in producing intentional change in organizations. The Academy of Management Review, 1995. Vol. 20, pp. 541-70.

gal, political, regulatory, etc. environment such as NHS, the likelihood of change fatigue is also more expected than in other sectors and for various reasons. And in fact, by observing failing English experience, these were among the main arguments for the kind of approach the Programme wanted to take in Wales.

As revealed by the interviewees, an initial scepticism towards change could be partly attributed to the past experience of ICT implementation in healthcare sector in Wales and which was then interlinked with anecdotal evidence about the present failures in England. Ford et al., call such evidence as one of three "generic resistance-giving backgrounds" - cynical background, which is constructed from historical failure either directly or vicariously experienced through stories and narratives of other's experiences[315]. However, other two backgrounds were also found evident within the NHS Wales – the complacent and resigned backgrounds, where the first being constructed on the basis of historical success and the second – from the historical failure. Taking into mind that even the complacent background has its pitfalls (such as situations where "success breeds failure" syndrome: where people continue to practice once-successful strategy and actions assuming that that is all that is necessary to continue producing success all the time), the ICT implementation in health involves many explicit and hidden challenges, when attempting to shift the so called "background conversations".

In addition, long-term participant observation has revealed additional insights regarding the initial resistance in relation to service improvement projects in Wales and which were more related to individual level of analysis, however influencing the "background conversations" to some extent at the same time. This insight partly contradicts with the conclusion that resistance is not a personal phenomenon, but a systemic social one in which resistance is maintained by the background conversations of the organisation[316]. From the Welsh case study shows, for instance, that other factors were important too, such as avoiding threat to the status quo in general, power relations and organisational politics ("there's a clinical group being led by the consultants and I can see that being a problem because they'll

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[315] *Ibid.*

[316] Ford J.D., Ford L.W. The role of conversations in producing intentional change in organizations. The Academy of Management Review, 1995. Vol. 20, pp. 541-70.

immediately assume that they are in charge of all the thing", "RADIS system is only a very, very small fraction to do with consultant radiologists it has got more to do with secretaries and administrators and office workers, radiographers, managers than a clinical consultant", "If you are going to give that emphasis to a clinical consultant you should…", "There are things we have done in the past which you know, if we had left it up to IT or clinical consultants they would have blocked and prevented us from doing which now they see as a huge benefit…". "So I think we have to sort out this sort of politics at the moment about who's doing what and once that's done then hopefully it should be a bit smoother") and related to different understandings or assessments of the same situation by different stakeholder groups.

It seems that within such context and circumstances, stakeholder engagement and clinical empowerment in the delivery of service improvement projects was especially powerful tool, because it allowed the revealing of different positions early on and provided possibilities for search of a "common denominator" over time. For instance, even very critical stakeholders at the beginning, with time change their positions, if they are invited to participate in the process, make contributions and especially see that their contributions are valued and taken forward. An example was given by an IHC's project manager that managed a radiology service improvement project and was working with a group of senior radiologists of Wales. One of them was in particularly negative towards the National Programme *IHC*, because, according to him, "he didn't believe that what it proposed will actually work". And because he was very vocal and very influential within that group, in the beginning it was very difficult to find ways to begin the discussion as such with the whole group. Moreover for a number of years that radiology group was developing one of the main radiology information systems in Wales called Radis 2 and, as revealed later, was not satisfied that "their product", as they said, was actually taken by the National Programme as their own and developed further. Moreover, they were afraid that the project won't end up in the same way as many of them in England. After some time the same person has acknowledged that he is sure that with the help of the National Programme, the information system that they get eventually will be much better than the information system they could have developed without it.

Among the main reasons that helped minimize a negative stance and resistance towards initiated change, was an entirely different approach from the part of the Programme, namely the multi-level stakeholder dialogue from the very beginning, i.e. project idea development stage and especially stakeholder empowerment to deliver it.

Early clinical engagement and empowering are an important factor to reduce stakeholder resistance, where "clinicians start to believe more when they hear that other more enthusiastic clinicians have a good experience with it". However it is important to understand who will be the actual end users of the IS and empower 'neglected' groups within the clinical discourses such as administrators, nurses, secretaries etc., if they will be using the end products.

Through early engagement and dialogue, the national programme was able to change stakeholder mindset from inward (single Trust) looking to understanding the needs of the whole Wales:

Knowing that lack of a "bigger picture" among stakeholders was identified as the main obstacles to enable national sharing of patient information, this is actually a great achievement. Moreover, disagreements and different views were found to be considered as very useful to generate new opinions and understandings.

These examples actually raise broader issues such as links between stakeholder engagement strategies, communication styles and more receptive perceptions of stakeholders towards technology-led organisational change. Through expert interviews and a long-term participant observation can be said that, despite many attempts, the NHS in the UK and the NHS in Wales were used to the prevailing instrumental communication style and constructivist communication style, which was taken forward by the Programme, was a surprise for many and it took quite a long time to make sense of it, to accept it and to believe that these are not temporal public relation manipulations. For instance, according to witnesses, even at the very beginning of the Programme "the political masters at the Welsh Assembly could only see what was happening in England. And were hell bent on following England's example, who know they assume that if England is doing this, this must be the way to go, we should do the same"; "I think we were following the English approach before Gwyn (IHC's Director – R.R.) came" (IHC manager). Only with the appointment of its permanent director, which had an extensive work experience of a similar work in England, the Programme started to take shape with its completely different approach that most national initiatives are.

Empirical evidence of the Welsh case study partly support the findings of Ford et al. in the way that reality, as well as resistance, is interpreted, constructed, or enacted through social interactions (conversations) in which people engage[317]. Moreover, different people in different positions at different moments live in different realities and have a different sense of themselves and their worlds. As a result, they will engage in different actions, and give different forms of resistance too. The more so because conversations are not only the process through which the reality is constructed but they are also the product of that construction process[318]. Meanings and understandings are contained within the vocabularies and communication protocols that comprise different realities. According to the authors, managers and employees who engage in such conversations are strengthening these realities in their organisations, "infecting" and re-infecting themselves and others with those conversations, and displaying the symptoms of those resistance-giving backgrounds. In such circumstances, resistance will also continue, unless and until these backgrounds are themselves addressed and changed. One thing is in particularly important i.e. the understanding that it is very difficult to challenge one reality from the point of view of another[319], where traditional attempts at reducing resistance could be seen through the "perceptual filters of the different backgrounds"[320]. For example, involvement, education, and participation are among the strategies recommended for dealing with resistance, however in a complacent reality, such strategies are likely to be seen as unnecessary; in a resigned reality as futile; in a cynical reality as malicious or manipulative[321]. Dialogue is considered to be able to bring background constructions (assumptions, conclusions, decisions, etc.) into the foreground so that they can be examined and to provided spaces for saying something

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[317] Ford J.D., Ford L.W. The role of conversations in producing intentional change in organizations. The Academy of Management Review, 1995. Vol. 20, pp. 541-70.

[318] *Ibid.*

[319] Ford J.D., Ford L.W. The role of conversations in producing intentional change in organizations. The Academy of Management Review, 1995. Vol. 20, pp. 541-70.

[320] *Ibid.*

[321] *Ibid.*

new and giving an opportunity to challenge, engage, explore, and create, thereby discovering underlying assumptions and opening new opportunities for action. Until this is done, the conversations remain transparent and unrecognised, existing below our level of consciousness where they are neither examined nor understood. Whereas altering these background conversations shifts the context in which the very content of our thinking and feeling occur and our beliefs and perceptions are organised[322]. When the background conversation shifts, the foundation on which we construct our understanding of the world shifts too, and we can feel, think, and behave in new ways.

Stakeholder engagement and change ownership / commitment towards change

The Welsh case provides clear evidence that stakeholder engagement can contribute towards the commitment and ownership of technology-led organisational change.

Herscovitch and Meyer (2002) described commitment to change as a force that binds an individual to a course of action deemed necessary for the successful implementation of a change initiative, and argued that this mindset can reflect (a) a desire to provide support for the change based on a belief in its inherent benefits (affective commitment), (b) a recognition that there are costs associated with failure to provide support for the change (continuance commitment to change), and (c) a sense of obligation to provide support for the change (normative commitment to change). Moreover, the authors also demonstrated that commitment to a change is a better predictor of behavioural support for a change than is organisational commitment, that affective and normative commitment to change are associated with higher levels of support than is continuance commitment, and that the components of commitment combine to predict behaviour.

Change ownership / commitment to change came as a paramount cross-cutting topic for a successful organisational change within healthcare context in Wales. As emphasized by most of the interviewees and suggested by the onsite-participant observation, the fact that new information systems are "owned" by the end users seems to be a very important pre-condition for the success of ICT-led changes.

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[322] Marzano, R., Zaffron, S., Zraik, L., Robbins, S. and Yoon, L. (1995), 'A new paradigm for educational change', Education, Vol. 116 No. 2, pp. 162-73.

The clinical staff was in particularly emphasised in this case. Just because of the ability for a long-term on-site participant observation, a conclusion can be made that early stakeholder engagement seemed to be among the most effective tools for a sense of affective and normative commitment among the end users in clinical contexts to develop. This gained even greater importance where changes in work practices were required. Moreover, involvement at the piloting stage of the initiative, although it is very important, is not sufficient – it has to be a continuous involvement in all roll-outs to gain staff ownership and commitment throughout the entire process of implementation of technology-led organisational change – its conceiving, development, deployment and enactment / integration within working processes and at every organisation experiencing the change as the same change may be viewed and appreciated by different organisational actors in quite diverse ways[323]. This insight is in line with the findings by DiBella that perceptions of the change vary at different levels of organisation and across the organisation's department-based sub-cultures. Therefore, wide-spectrum continuous involvement is required[324].

However, involvement as such is not enough. Stakeholder empowerment is the key to gaining stakeholder commitment to change, the more so in cases where changes are expected to take place in working practices and existing working routines. Otherwise, there is a much greater risk that the stakeholders will openly oppose the decisions made for them or withdraw their support altogether, at the same time jeopardising the implementation of the entire project. This finding is in line with the research by Dibella, which also suggested that change advocates and managers get into difficulty when they project their own perceptions of the desirability of some change onto others as usually change perceived as desirable by some participants or set of stakeholders is often perceived as undesirable by others[325]. Without the willing or active involvement of participants, change initiatives do not succeed, or they may lead to unintended or counterproductive consequences, therefore managing participant perceptions is a fundamental element of

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[323] DiBella A. J. Culture and Planned Change in an International Organization: A Multi-Level Predicament. The International Journal of Organizational Analysis 4(4). 1996. p. 352-372.

[324] *Ibid.*

[325] *Ibid.*

managing the change itself. Individual stakeholders shall see that they are crucial for making the project a success

The most important aspect of stakeholder engagement in relation to stakeholder commitment to change and change ownership is the ability to form a “shared vision”, because stakeholders shall “feel part of the process, so they all collectively own that particular change initiative effectively, which leads to a more successful project delivery” (IHC’s service improvement project manager, S.T.), as there are “many activities to gain consensus on and get the whole clinical community on board” (IHC service improvement project manager, S.T.). However the quality of stakeholder engagement is actually demonstrated not by a formal commitment to delivery, but by the willingness of the stakeholders to share and commit their own resources for changes to take place (human, financial, time, expertise etc.). This can only take place if stakeholders trust each other.

To get commitment and ownership of the changes being initiated is linked with the ability to change the prevailing world views and ‘restricted’ mindset and develop a shared vision through an early stakeholder engagement, because when participants view change, it is filtered through their preferences and appreciated and accepted, or resisted accordingly[326]. To shift these perceptions is the key for any change to take place. In the Welsh case crucial importance gave an event called a National Architecture Week held at the initiation of the Programme in September 2005, where a week-long event invited fifty clinicians and fifty managers from the NHS in Wales, who have discussed together the concepts of an individual health record and gained broad agreement on the way forward. But the most important aspect that this event, according to information gathered from many interviewees and the insights gained from on-site participant observations was the ability for the NHS to contribute to the development of strategic vision of the changes planned and be part of them at the same time feeling that successful implementation highly depends on their contributions. In this respect, Ford and Ford also suggest that change unfolds are based on how participants communicate and converse about the transition they are expe-

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[326] DiBella A. J. Culture and Planned Change in an International Organization: A Multi-Level Predicament. The International Journal of Organizational Analysis 4(4). 1996. p. 352-372.

riencing[327]. Very often change is "measured" by consistency with personal values or self-interests and is usually more welcomed, where change is seen as helping personal welfare. However achieving the status when organisational participants value the greater good / a shared vision, change regarded as beneficial to one's colleagues, employer, or society-at-large would be considered more favourably[328].

A good practical example that shows the link between stakeholder engagement and ownership of the changes being initiated is an extract of the interview with an IHC's manager of a service improvement project reflecting on personal experience of participation in the National Architecture Week in 2005.

These insights partly support the findings by Ferres & Connell, that cynicism toward change is a cognitive attitude that represents a lack of belief in the positive outcome of a change due to the incompetence of those responsible for the change, and it might be manifested in higher resistance, lowered job satisfaction, reduced commitment, and deterred citizenship behaviours[329]. In this way, participant and stakeholder perceptions of change can serve as indicators of the relative success or progress of change implementation[330]. The more widespread the view that change is desirable and inevitable, the more progress can be presumed to have been made towards reaching the change goal or outcome. That suggests that change managers must manage or shape participant perceptions even as they manage the change itself. Doing so, given the classical OD model of moving from current state to desired state (Burke, 1994), means monitoring and shifting participant perceptions throughout the transition phase. If too many participants, stakeholders, recipients, or presumed beneficiaries of some change see it as undesirable, the political pressure against change will create a major force restraining implementation (Dibella, 2007).

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[327] Ford J.D., Ford L.W. The role of conversations in producing intentional change in organizations.The Academy of Management Review, 1995. Vol. 20, pp. 541-70.

[328] DiBella A. J. Culture and Planned Change in an International Organization: A Multi-Level Predicament. The International Journal of Organizational Analysis 4(4). 1996. p. 352-372.

[329] Ferres N., Connell J. Emotional intelligence in leaders: an antidote for cynicism towards change? Strategic Change, 2004, Volume 13, Issue 2, p. 61–71.

[330] DiBella A. J. Culture and Planned Change in an International Organization: A Multi-Level Predicament. The International Journal of Organizational Analysis 4(4). 1996. p. 352-372.

Stakeholder engagement and internal cooperation

Among the most significant effects, that stakeholder engagement had in Wales was increased internal cooperation among the healthcare providers both across horizontal and vertical lines of the healthcare organisation. This was in the particularly important outcome as a counterbalance to the disproportional power of IT suppliers in this respect. According to interviewees, the Programme enabled everybody to start heading towards one goal, which created the conditions for the development of internal cooperation networks.

This was a big change comparing to the practice they had before as they wouldn't have contacted anyone internally; they would have gone to IT suppliers directly, however such practice had its "side effects".

Internal cooperation to take place requires changing mindset from inward-looking to a broader all-Wales view and time. As reflected by a local project manager of IHC, "whilst it was a word last year, it was not in practice and it does work very well and we are sharing a lot more information about ourselves and clearly because of that we are going for more of a similar approach" (a Local Project Manager of IHC; JH).

The initial reaction to the IHC's approach from the NHS was not a very positive one. On the contrary, people were worried and looked at the initiative suspiciously. The biggest benefit of the approach was mutual learning that actually has convinced the service for further cooperation.

Internal cooperation requires trust among the cooperating partners. This was naturally developed among the close proximity territories in Wales only. With e-health initiatives requiring the ability to share patient data across various parts of Wales, this was among the biggest challenges for the National Programme. With the role as a platform for joint interactions, the Programme enabled cooperation and learning among the healthcare providers in NHS Wales:

This approach actually helped to manage different risks and solve various problems, for instance, mitigate data security (actually trust) concerns by the clinicians ("it's quite a thing to let someone into your practice and install some software on your machines, in trusting that this project is going to keep your information secure"), because bad news "spread like wildfire amongst the GP practices", if they are not happy with the project, also bridge the gap between different healthcare service providers, for instance, "…there were some tensions between the in hours GPs and the Out of Hours service wanting to make sure the Out of Hours service were going to handle their information securely", also tensions between the NHS and IT suppliers: "…GP practices had tensions with the new supplier we brought in because the GP practices have their IT systems from other different suppliers and our supplier that we brought in to get the data had to work with their GP systems suppliers and there wasn't always seeing eye to eye between our new supplier and the existing GP suppliers".

Stakeholder engagement and trust

General definition of trust, which also is used by many other researchers, was delivered by Mayer et al. treating trust as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trusted, irrespective of the ability to monitor or control that other party"[331]. In addition to willingness to be vulnerable, Allen et al. are mentioning other actively widespread agreement on a further two conditions required for trust, i.e. some degree of risk and interdependence[332]. According to them, risk originates in interpersonal relationships when either party is uncertain of how the other will act while interdependence occurs when the needs or interests of one party cannot be achieved without the assistance of the other party.

Trust as such is not a new concept within organisational change context. Numbers of scholars have identified trust to play an important role in innovation and change research, for instance, Armenakis et al., Michaelis et al.; and Pedro & António[333]. Moreover, according to Meyer & Stensaker, trust, in this respect, does not mean that organisational members necessarily like the changes or commit to the changes, but knowing what will

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[331] Mayer R.C., Davis J.H., Schoormann F.D. An integrative model of organizational trust: past, present, and future, Academy of Management Review, 2007. 32(2), pp. 344–354.

[332] Armenakis A.A., Harris S.G., Mossholder K.W. Creating Readiness for Organisational Change, 1993, June 46: p. 681-703.

[333] Armenakis A.A., Harris S.G., Mossholder K.W. Creating Readiness for Organisational Change, 1993, June 46: p. 681-703. / Michaelis B., Stegmaier R., Sonntag K. Affective Commitment to Change and Innovation Implementation Behavior: The Role of Charismatic Leadership and Employees' Trust in Top Management. Journal of Change Management, December 2009, Vol. 9, No. 4, 399 417.; and Pedro & António, 2006.

happen creates a certain predictability which can also lead to maintained trust in management[334].

In case of the Welsh experience, trust played an important part in ICT implementation in the healthcare sector. Because ICT implementation is related to the extremely sensitive essence of healthcare organisation, i.e. the quality of patient care and information, trusting those, who are deploying new information systems, is a very important aspect of the technology-led change management. It seems that risk is always persistent and is always considered by everybody working in this sector and risk mitigating strategies through stakeholder engagement and communication is of ultimate importance.

This insight corresponds with the findings by, who says that employees are experiencing strong cognitive reactions accompanied by strong negative emotions, such as fear or anger, will be likely to reject the changes in general. The more so in the healthcare sector because of independence and autonomy of professionalised bureaucracies and where yet again "bad news may spread like wildfire" if clinicians are not happy with the project.

Within the Welsh context, gaining trust was especially linked with end users' engagement and ability to participate in the entire IS's development process, from its very start (such as conception phase) through the development of the product to smooth integration within the working processes at individual working place level. A practical example how trust through engagement works in day-to-day situations was given by an IHC's project manager.

In the scientific literature this is called "participative decision-making" (hereafter- PDM) and is identified with several effective management practices, such as providing organisational support, and ensuring that expectations are fulfilled[335], through which trust may be increased. Close working with the end users seems to have increased their sense of control over the change and generated more confidence in those who have enabled for more control over the change at the same time. This generally corresponds to the earlier research findings that when employees have a high sense of control over a change intervention, it means they believe the outcomes associated

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[334] Meyer C.B., Stensaker I.G. Developing capacity for change. Journal of Change Management, June 2006, Vol. 6, No. 2, 217 231.

[335] Allen J., Jimmieson N.L., Bordia P., Irmer B.E. Uncertainty during Organizational Change: Managing Perceptions through Communication. Journal of Change Management, 2007. Volume 7, Issue 2.

with it are more predictable, thus making them feel more comfortable and increasing the likelihood of adherence to that change[336].

A study by Allen et al., which aimed to understand how trust influences the effectiveness of the information employees received during change in addressing particular types of uncertainty, has also found out that employees who trust management or their organisation may be more willing to be vulnerable to the actions of management, believing the rationale for such decisions presented by management[337]. In contrast, employees who do not feel they can trust management are more likely to be critical of the information or justification they receive in the context of organisational change. The importance of this was also found within the Welsh context, when, for instance, Trusts were ready for taking up more risk and another sacrifice in relation to implementing a nationally compatible information systems.

Also, the relationship between trust and change is suggested to be seen as reciprocal, rather than linear, since, if trust is fundamental to successful change, success should increase collaborators' trust in top management[338]. This was also seen in Wales, where successful implementation of one service improvement project actually paved the way for new initiatives to come.

Stakeholder engagement and crossing organisational boundaries

The power of stakeholder engagement for facilitating cooperation across organisational and professional boundaries was among the most surprising and most exciting from the insights gained from the Welsh case. For instance, as reflected back by one of the IHC's project managers, there were several cases when for one or another reason stakeholders were not able to work together, but with the Programme as facilitator and through the stakeholder engagement, the organisational and professional walls were broken down, for instance (as reflected by the national IHC's project manager).

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[336] Allen J., Jimmieson N.L., Bordia P., Irmer B.E. Uncertainty during Organizational Change: Managing Perceptions through Communication. Journal of Change Management, 2007. Volume 7, Issue 2.

[337] *Ibid.*

[338] Mayer R.C., Davis J.H., Schoormann F.D. An integrative model of organizational trust: past, present, and future, Academy of Management Review, 2007. 32(2), p. 344–354. / Allen J., Jimmieson N.L., Bordia P., Irmer B.E. Uncertainty during Organizational Change: Managing Perceptions through Communication. Journal of Change Management, 2007. Volume 7, Issue 2.

Another interesting aspect that was extracted as part of long-term observation was the role of hybrid roles when a person working with IT has the clinical background or representatives of medical staff have a particular interest in healthcare IT.

Stakeholder engagement and organisational learning

According to Senge, contemporary world creates environments in which the needs and possibilities for learning are greater than ever and has suggested five components requiring gradual converging to innovate learning organisations, namely personal mastery, mental models, building shared vision, team learning, and systems thinking[339]. At the same time, it is recognised that there are great challenges too in relation to building such capabilities.

Among the ones of them are related to traditional managerial practices that contain a number of factors preventing organisational learning, i.e. fragmentation, reactiveness, and competition[340]. In terms of fragmentation, there is a tendency to break problems apart, find solutions to the parts then combine them on the assumption that this would provide a solution to the whole problem[341]. Regarding organisational competition, organisational members usually compete in demonstrating whose expertise is more "expert", who is right or more "managerially" skilled[342], etc. Conflict and so called "freely negotiated interaction" is usually intolerable in organisational life as it demands both closure and a winner and, therefore, is usually avoided or "normalized" in procedures which make conflict look like it has been managed effectively[343]. Then reactiveness to events, situations and "problems" that have immediate implications for one's expertise or image becomes standard operating procedure for problem-solving and is defined

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[339] Senge P.M. The Fifth Discipline. The Art & Practice of The Learning Organisation. Random House, 2006. p. 5-11.

[340] Senge P.M. The Fifth Discipline. The Art & Practice of The Learning Organisation. Random House, 2006. p. 234. / Senge P.M. The Fifth Discipline: The Art and Practice of the Learning Organisation. New York, NY: Doubleday. 1990. p. 424.

[341] Bokeno R.M. Introduction: appraisals of organizational learning as emancipatory change. Journal of Organizational Change Management, 2003, Vol. 16, No. 6, 603 618.

[342] *Ibid.*

[343] *Ibid.*

as managerialism (short-term, quick fix, career motivated problem-solving) or, according to Senge, “system-blindness”[344].

Although in professional bureaucracies these factors tend to be articulated even stronger[345], Wales was able to avoid or mitigate the impact of these factors through stakeholder engagement. An organisational learning was among the main assets that stakeholder engagement gave to the ICT implementation in healthcare in Wales. Moreover, the case study also has revealed some particularities to make organisational learning more effective in relation to technology-led organisational change in healthcare, where crossing organisational and professional boundaries was in particularly required and where participative decision-making, stakeholder empowerment, and dialogue were the right pre-conditions for organisational learning and, therefore, associated benefits to being realised.

First of all, as revealed in the interviews and on-site participant observation, increased internal cooperation in the NHS Wales was among the most positively surprising outcomes of the way national ICT implementation in NHS Wales was undertaken. Stakeholders were in particularly satisfied with the possibilities for more internal cooperation as a possibility for learning (“…so the programme coming along enabled everybody to start heading towards one goal. And what it has done for me is that it’s given me individuals working in other Trusts, doing a similar kind of thing, and that becomes a very good resource.”). As in the example below, there was a lot more coordination and learning from each other rather than relying on private IT suppliers.

Another important aspect was the communication across organisational and professional boundaries as a pre-condition for the-whole-NHSWales-organisational learning. Not because of the very time-consuming process as such to achieve, although true (for instance, “…and whilst it was a word last year, it is not in practice and it does work very well and we are sharing a lot more information about ourselves and clearly because of that we are go-

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[344] Senge P.M. The Fifth Discipline. The Art & Practice of The Learning Organisation. Random House, 2006. / Senge P.M., Kleiner A., Roberts C., Ross R.B., Smith B.J. The Fifth Discipline Fieldbook. Strategies and Tools for Building a learning Organization. ACurrency and Doubleday, 1994.

[345] Law on Health System of the Republic of Lithuania No. I-552. *Official gazette*, 1994, No. 63-1231.

ing for more of a similar approach"), but because of the lack of cooperation tradition. According to Senge, very often organisational "cultures" form complex webs of mechanisms that embody past learning into constraints and guidelines for present actions[346]. If this is the only form of memory the organisation has, it will be very difficult to break free of the authoritarian style of management that constrains creativity and innovation, because the questions why these procedures, structures and policies were making sense in the first place remain unasked. Although it seemed that partnership working had a different emphasis and meaning in Wales than in England[347], partnership working across vertical and horizontal boundaries in NHS Wales was not a common practice in general, neither in relation to ICT implementation in health in particularly in NHS Wales. Moreover, the initial course of the national programme seemed to be more likely to the English approach:

The need to integrate or deploy integrated information systems actually required a shared vision for Wales and among the parties involved. Instead of taking a top-down approach, the national programme actually stimulated multi-level stakeholder engagement and mutual learning. As a first very important step was a national one-week event called "Architecture Week", which was organised at the outset of the national programme, the main purpose of which was to "sketch" a common vision for Wales in relation to an individual health record. This was not a few-speakers-conference, but a working event with many working groups and task forces. Later this was followed by multi-professional service improvement project teams and working groups with a large annual programme review event presenting external assessment of the programme by a team of international experts to the service and the Welsh government and together agreeing on the way forward. For instance:

What was in particularly important in relation to the Welsh context, was the fact that Wales succeeded in overcoming so-called "traditional managerial practices" in NHS Wales, such as short-term thinking, quick fixes to problems and the self-promotion to make visible one's ability to do that. Instead, collaboration across organisational and professional boundaries

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[346] Senge P.M. The Fifth Discipline: The Art and Practice of the Learning Organisation. New York, NY: Doubleday. 1990. p. 424.

[347] Entwistle T. "The distinctiveness of the Welsh partnership agenda", International Journal of Public Sector Management, 2006. Vol. 19 Iss: 3, p. 228 – 237.

actually helped to ally or seek common points among "different frames of meaning and identity" etc., i.e. everything that, according to Giddens, Giroux, Katz and Kahn and Beach (in Durant & Cashman)[348], differentiate the boundaries in general. A very strong feature of the boundaries is the ability to allow or disallow challenging or contradictory evidence to the frames[349], with the later more common among the parties involved. Taking the Welsh approach, this was actually taken into account at the initiation stage of the national programme and actually resulted in recognising by the stakeholders of the limits built into different discourses and in the ability of taking a critical view of authority, which secures the "regimes of truth" at the same time denying gaps, limits, specificity, and counter-narratives. Moreover, the national programme provided a site for co-construction of broader perceptional structures and learning.

Among the main pre-conditions for allying the worldviews and, therefore, mutual learning towards all-Wales perspective was communication and dialogue through which information and knowledge were revealed and shared.

This new insight in relation to the national ICT implementation in health process actually partly confirms the conclusions by Durant & Cashman, that organisational learning is a site that highlights boundaries and thus has the potential to support emancipatory processes[350]. In this way communicating across boundaries in order to expand capabilities might contribute to understanding and therefore to community building[351].

What was actually found as very important within the Welsh context of ICT implementation in health, was the specifics of dialogue and communication, which was undertaken not through the traditional so-called instrumental framework of "sender-message-receiver-feedback-interference"[352], but through a constructivist approach, emphasizing the

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[348] Giddens (1984), Giroux (1992), Katz and Kahn (1978) and Beach (1990) in Durant R.A., Cashman J.F. Theorizing limits: an exploration of boundaries, learning, and emancipation. Journal of Organizational Change Management, 2003, Vol. 16, No.6, 650-665.

[349] *Ibid.*

[350] Giddens (1984), Giroux (1992), Katz and Kahn (1978) and Beach (1990) in Durant R.A., Cashman J.F. Theorizing limits: an exploration of boundaries, learning, and emancipation. Journal of Organizational Change Management, 2003, Vol. 16, No.6, 650-665.

[351] *Ibid.*

[352] Frahm J., Brown K. First steps: linking change communication to change receptivity. Journal

way individuals and their experiences were shaped by and through language, and where all participants are treated equally. The later aspect – the ability to involve and work with professionals from all organisational levels of NHS Wales, and in particularly with a so-called grassroots level, can be called as the power of the Welsh approach. Taylor and Van Every call this as suitable for emergent organisations[353], where organisational learning offers "dialogue" as the means for transformation[354]. The same aspect was also emphasised by Habermas[355]. In relation to the Welsh case study, this actually was taken into account by engaging many stakeholders on an equal partner base and especially those previously under-represented in the decision-making process at various levels, but yet very important for a project implementation success, first of all for their tacit knowledge about the work they do and the second, their influence on the success of the implementation process.

This approach actually allows minimizing such issues when organisational members view one another's central issues as esoteric, if not meaningless[356], which is very typical not only in the public sector but in the majority of working areas in general. It seems that the IHC Programme have identified the right approach to take into account the specifics of the multilevel nature of a nationally implemented change in NHS Wales, the power and politics of Mintzberg's "professional bureaucracies"[357] and the impact that each layer can make to the implementation process – the emphasis on dialogue, which according to Isaacs, is an interpretive or relational aspect of organisational learning, and which had the power to assure alignment and coordination of NHS Wales organisational members' perceptions and understanding[358].

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of Organizational Change Management, 2007, Vol. 20, No. 3, 370 387.

[353] Taylor J.R., Van Every E.J. The Emergent Organization: Communication as its Site and Surface, Laurence Erlbaum and Associates Inc, Mahwah, NJ. 2000.

[354] Bokeno R.M. Introduction: appraisals of organizational learning as emancipatory change. Journal of Organizational Change Management, 2003, Vol. 16, No. 6, 603 618.

[355] Habermas, J. Communication and the Evolution of Society, Heinemann, London. 1979.

[356] Durant R.A., Cashman J.F. Theorizing limits: an exploration of boundaries, learning, and emancipation. Journal of Organizational Change Management, 2003, Vol. 16, No. 6, 650-665.

[357] Mintzberg H. The structuring of organisations. Prentice-Hall, Englewood Cliffs. 1979.

[358] Isaacs W. Dialogue and the Art of Thinking Together: A Pioneering Approach to Communicating. 1999. in Business and in Life, Currency, New York.

Another aspect, which was crucial in relation to organisational learning within the IHC's context, was the role that the National Programme played in the process of the national implementation of eHealth in Wales. Weick and Quinn analysed different change communication perspectives and suggested that usually the role of change agent in planned change is that of prime mover (i.e. it sends messages to change behaviour), whereas in continuous change models (or emergent change) a more effective role that the change agent could play is a sense maker of the active dialogue that constructs an organisation[359]. In relation to the Welsh experience, the National Programme acted first of all as a facilitator and a provider of 'platform' for dialogue and a 'constructor' of a common vision. From a longitudinal study and participant observation, the trust came out as a very important aspect not only for cooperation between the healthcare providers in Wales to take place, for instance.

But in the Programme as a change agent too for organisational learning to be successful and especially within the context of a failing health IT programme in England. As mentioned above, the concept of trust has already demonstrated its effectiveness in the context of organisational change (for instance, Armenakis et al.)[360]. The Welsh case study research suggested that the importance of change agents' credibility, trustworthiness, and sincerity in creating participants' readiness for change was important for stakeholders to be willing to cooperate with the Programme as such and a mutual learning.

As a result, the most important outcome of the organisational learning in the NHS Wales was an internal (NHS Wales) accumulation of information and knowledge in relation to ICT implementation in Wales and becoming as an intelligent client in the longer perspective.

Although time-consuming to achieve (for instance, "…and whilst it was a word last year, it is not in practice and it does work very well and we are sharing a lot more information about ourselves and clearly because of that we are going for more of a similar approach"), internal stakeholder cooperation has opened new possibilities for internal organisational learning in

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[359] Weick K.E., Quinn R.E. Organizational change and development. Annual Review of Psychology, 1999, Vol. 50, p. 361-86.

[360] Armenakis A.A., Harris S.G., Mossholder K.W. Creating Readiness for Organisational Change, 1993, June 46: p. 681-703.

the NHS in Wales as against dependency on IT suppliers and therefore has considerably reduced the risk of project failure (for instance, "…now I can short-circuit a lot of that early work by getting documentation by going to, informally going to see colleagues' systems without the companies necessarily being aware and starting to put the pressure on you to buy this system. It gives us a more subjective view.").

As a result, more intelligent customer through stakeholder engagement and empowering is able to avoid potential threats from the very beginning, for instance, as reflected by a local IHC's project manager in North Wales, "…so (due to their experience in the field – R.R.) we are at a position that we know exactly what we want and you know can help inform the path of IHC"). Another aspect, which is very important in relation to this, is an ongoing process of knowledge accumulation and internal retaining in the NHS Wales as compared to one-off services provided by the external consultants. This insight corresponds to Senge's conclusions that learning has to be understood as a continual, ongoing, lifelong process, one that does not end when solutions are derived or decisions are made or responses to external conditions have been retrieved from organisational memory[361]. It seems as well that for a small country internal organisational learning in relation to e-health development is even more important than in big ones, which can throw substantial financial resources.

Stakeholder engagement and cooperation / quality of healthcare

A systematic review, which has assessed the effectiveness and consequences of various eHealth technologies on the quality and safety of care delivered by Black et al., concluded that there is considerable international interest in exploiting the potential of electronic solutions to enhance the quality and safety of health care, however, empirical evidence is yet lacking with large gaps remaining between the postulated and empirically demonstrated benefits[362]. At the same time the study also makes reference to the aspect that greater attention shall be paid to the socio-technical aspects in

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[361] Senge P.M. The Fifth Discipline. The Art & Practice of The Learning Organisation. Random House, 2006.

[362] Black A.D., Car J., Pagliari C., Anandan C., Cresswell K., Bokun T., McKinstry B., Procter R., Majeed A., Sheikh A. The Impact of eHealth on the Quality and Safety of Health Care: A Systematic Overview. PLoS Medicine, 2011, Vol. 8, Issue 1, 1-16.

formal evaluations of eHealth, where the quality of patient outcomes and, therefore, the quality of care in overall may be related to the design, development and deployment of eHealth solutions[363].

In relation to the Welsh case study, the way the design, development and deployment processes of service improvement projects were undertaken have provided indicative evidence that this will have a direct impact on the success of the changes being initiated, the quality of patient care and, therefore, patient outcomes in the longer term.

Furthermore, numbers of features previously identified as contributing to patient care were also found within the Welsh context as very important for the success of the changes being initiated. A study by Ammenwerth et. al. has concluded that the outcomes from introducing informatics applications in complex health care settings depend more on organisational context than on a particular technology, therefore health informaticians must not only learn from failures but also avoid both uncritical scepticism that may arise from drawing overly general conclusions from one negative trial, as much as uncritical optimism from limited successful ones[364]. In Wales this was addressed by an incremental / step-by-step approach towards ICT-led organisational change in health, according to the Programme, by also taking into account that "Gwent isn't the same as if you are working in north Wales" and in "Abergavenny you work this little different way so we need to make, just change the system a little bit to match what you do, and to also provide you with all your reports and your outputs". This shall be taken into account despite the fact that "you could argue whether that should be the case or not, if you are a diabetic looking for healthcare, should it be different but forget those arguments a minute, that's a reality". In Wales this was addressed by first of all implementing the service improvement projects and then undertaken site-by-site adjusted implementations around the Trusts in Wales as against the "big bang" national roll-outs after one piloting project was somewhere and somehow implemented. A systematic review on effects of computerized clinical decision support systems on practitioner performance and patient outcomes (Garg et al., 2005) has also suggested

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[363] *Ibid.*

[364] Ammenwerth, E., Iller, C., & Mahler, C. (2006). IT-adoption and the interaction of task, technology and individuals: a fit framework and a case study. BMC Medical Informatics and Decision Making.

that so-called “in-house” developed systems usually deliver better results comparing to those procured “off-the-shelf”, because the first usually undergo extensive evaluation with continual improvement and are supported by a strong sense of local ownership by their clinical users. By contrast, lack of successful implementations of commercial systems is typically related to the assumptions about work practices embedded within them, which are often not easily transferable to different contexts of use[365]. Additionally, it is not unusual for insufficient time and effort to be devoted to the all-important customization process[366]. In Wales these aspects were well articulated by finding a pragmatic balance (i.e. selecting those IS, which are better) between “in-house” developed and adjusted commercial “off-the-shelf” information systems, with devoted necessary time for each IT solution to test them and adjust in line with the users’ needs, by an early involvement of suppliers in the process, but only as partners in the work, not the drivers of the entire process.

Moreover, the in-depth analysis of the Welsh case also revealed that the stakeholder engagement was a very strong stimulus behind the aspects of successful implementation mentioned above, but also delivered new insights in relation to innovation and quality of care. For instance, just because of the ability of the National Programme IHC to “direct the NHS in Wales towards one goal”, conditions are created for the better treatment of patients with chronic diseases.

Increased internal cooperation in the NHS Wales created the conditions for producing better specifications for the planned deployments of information systems. An ability to make better choices for selecting them as compared to the ‘traditional’ way of doing such work when healthcare providers usually found themselves in an unequal relationship with large IT providers was found very important within the Welsh context too.

Stakeholder empowerment was found in particularly important as it directly relates to the sense of ownership of the changes being implemented, first by those experiencing it. Many impact implications were found related to various aspects of greater change management effectiveness, but some

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[365] Black A.D., Car J., Pagliari C., Anandan C., Cresswell K., Bokun T., McKinstry B., Procter R., Majeed A., Sheikh A. The Impact of eHealth on the Quality and Safety of Health Care: A Systematic Overview. PLoS Medicine, 2011, Vol. 8, Issue 1, 1-16.

[366] *Ibid.*

evidence also suggested that greater ownership may also result in a greater level of data quality and, therefore, better patient care.

Users meanwhile recognise (which is an important factor by itself) that one or another IT product is better comparing to one they could have achieved without the Programme and that it would have been almost impossible for us to arrange you know like single user log-on throughout the whole of Wales, that type of thing without it." (RADIS manager at a Trust, T.H.)

The innovation here is related to the integration of healthcare delivery and cooperation across organisational and professional boundaries.

Stakeholder engagement and sustainability

It was found that stakeholder engagement was also contributing to the changing sustainability. For instance.

But the most important aspect, which is emphasised in relation to change sustainability in a wider literature is related to an ability to build a learning organisation[367]. According to the authors, a systemic approach, a learning and becoming perspective toward change, trust, an appropriate role perception, and the specific use of management instruments contribute to sustained change that resulted in performance improvements and a move toward a learning organisation. This evidence was also found in the case of the Welsh approach.

To achieve sustainable change, change efforts need to consider and address different organisational aspects simultaneously, such as strategy, structures and processes, managerial systems and instruments, leadership, and culture[368]. These aspects were well addressed by the Welsh approach towards the national process of ICT implementation in health.

Several aspects were derived from the empirical data, which contribute to a more effective stakeholder engagement in a national process of eHealth development, such as viewing stakeholders as a valuable resource, involving clinicians and especially the end users' of planned health information sys-

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[367] Sackmann S.A., Eggenhofer-Rehart P.M., Friesl M. Sustainable Change: Long-Term Efforts Toward Developing a Learning Organization. The Journal of Applied Behavioral Science, 2009, Vol. 45, No. 4, 521 549.

[368] *Ibid.* and Senge P.M. The Fifth Discipline. The Art & Practice of The Learning Organisation. Random House, 2006.

tems at the outset of the service improvement projects, undertake an incremental implementation process with an extensive multi-dimensional stakeholder engagement (taking into account the width and multi-levelness of the institutional context of a national health service) at every stage, for instance on agreeing on eHealth national implementation strategy and undertaking of service improvement projects, facilitating stakeholder (user) empowering and organisational learning in overall, but retaining control over the entire implementation process. The role of the national coordinating body (such as the national programme) mainly should focus on creating a platform for stakeholder interaction and organisational learning for the entire national health service by facilitating internal cooperation, providing strategic direction, reducing risk and dependency on IT suppliers and breaking professional and organisational boundaries by stakeholder empowering, but at the same time retaining control over the process. Only then stakeholder engagement may result in the improved change communication, increased change receptivity, change ownership and commitment towards change, internal cooperation and trust, ability to cross organisational and professional boundaries, stakeholder engagement and organisational learning / innovation / quality of healthcare and sustainability in organisational change that actually contribute to the innovation in patient care and sustainability of organisational change and therefore an overall quality of patient care.

2.3. An overarching framework for in-depth analysis of the national process of ICT implementation in healthcare sector

ICT implementation in healthcare is more socio-organisational process than a technical one and that patient-focused approaches of healthcare delivery require changes in work organisation and in an overall delivery of healthcare services.

Figure 2.5 presents an “ideal framework” of the national process of ICT implementation in health. With the aim to reflect a very important role of stakeholder engagement in the national eHealth development processes, the framework consists of three equal parts: the stakeholder engagement, technical deployment of ICTs and management of organisational change. Unlike the predominant technical / functionalist paradigm in IS research and many difficulties encountered in deploying ICTs in health in practice within that

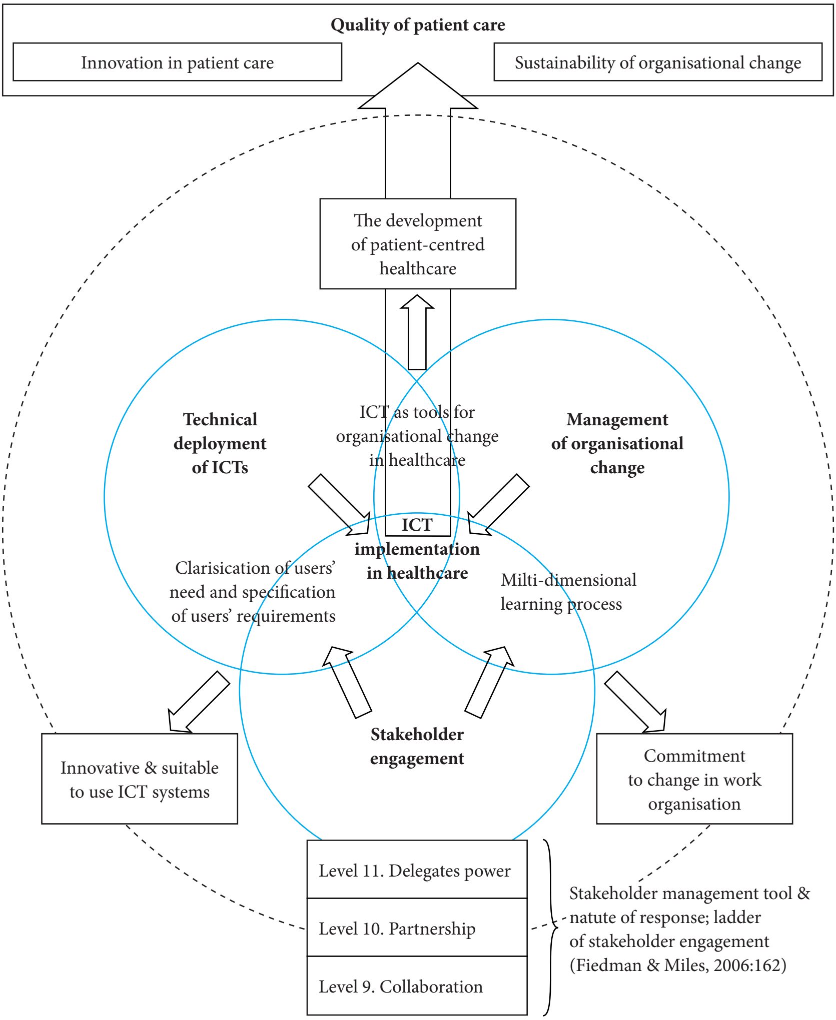

Figure 2.5. The Conceptual framework of the national eHealth development

Source: Rasa Rotomskiene (2011), Doctoral Dissertation. Innovation and Sustainability in the Implementation of eHealth: an International Perspective on the Role of Stakeholders.

philosophical approach, the framework emphasises the need for organisational learning through multi-level stakeholder engagement and "orchestrated" organisational change, where organisational change process in relation to eHealth development at the national level with multiple stakeholders, powers and interests is seen as mainly communication problematic. The biggest focus here is placed on stakeholder engagement: it was identified that stakeholder (and especially the user) engagement may contribute to the improved change communication, change receptivity, change ownership and commitment towards change, considerably increase internal (within the healthcare sector) cooperation and trust, as well as ability of crossing organisational and professional boundaries, it also highly contributes to organisational learning / innovation / quality of healthcare and sustainability of organisational change. Therefore, stakeholder engagement contributes to the overall management of organisational change through the multi-dimensional learning process by increasing overall commitment to changes in work organisation. At the same time, stakeholder engagement contributes to the overall technical deployment of ICTs in health through clarification of users' needs and specification of users' requirements by developing innovative and suitable to use ICT systems. ICTs on their own part have to be seen as tools for organisational change in healthcare, not as an ultimate goal in itself.

However, as revealed by the comparative research, stakeholder engagement as such does not always lead to successful project outcomes or more efficient national process of eHealth development. Empirically grounded research findings on how to involve stakeholders to achieve innovation in patient care and sustainability in organisational change were identified and these are related to the levels of stakeholder engagement and management (identified by employing the ladder of stakeholder management and engagement, Friedman & Miles, 2006: 162[369]) and to the stakeholder engagement strategies derived from the empirically grounded data analysis of the case studies of this research.

Regarding the levels of stakeholder engagement and management identified by Friedman & Miles (2006: 162), levels 9 (collaboration) – 11 (delegated power) are most suitable for the engagement of end users in the national process of eHealth development, where degrees of involvement / degrees of stakeholder power are varying from proactive to trusting, intention of engagement is varying from affording some decision-making power to stakeholders over specific projects to minor-

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[369] Friedman, A.L. & Miles, S. (2006), Stakeholders: Theory and Practice. p. 162-163.

ity representation of stakeholders in decision-making process; level of stakeholder influence forming and agreeing to decisions and with multi-way dialogue varying from strategic alliances to board representation. Meanwhile IT suppliers have to be involved in a way they could be tightly management by the coordinator of the national process (for instance, a national programme).

Several aspects were derived from the empirical data, which contribute to a more effective stakeholder engagement in a national process of eHealth development, such as viewing stakeholders as a valuable resource, involving clinicians and especially the end users' of planned health information systems at the outset of the service improvement projects, undertake an incremental implementation process with an extensive multi-dimensional stakeholder engagement (taking into account the width and multi-levelness of the institutional context of a national health service) at every stage, for instance on agreeing on eHealth national implementation strategy and undertaking of service improvement projects, facilitating stakeholder (user) empowering and organisational learning in overall, but retaining control over the entire implementation process. The role of the national coordinating body (such as the national programme) mainly should focus on creating a platform for stakeholder interaction and organisational learning for the entire national health service by facilitating internal co-operation, providing strategic direction, reducing risk and dependency on IT suppliers and breaking professional and organisational boundaries by stakeholder empowering, but at the same time retaining control over the process. Only then stakeholder engagement may result in the improved change communication, increased change receptivity, change ownership and commitment towards change, internal cooperation and trust, ability to cross organisational and professional boundaries, stakeholder engagement and organisational learning / innovation / quality of healthcare and sustainability in organisational change that actually contribute to the innovation in patient care and sustainability of organisational change and therefore an overall quality of patient care.

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3. ANALYSIS OF e-HEALTH PROJECTS IN LITHUANIA

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The enhancement of the health system in terms of its quality, accessibility and transparency as well as the patient-centred approach, mainstreaming of health policy principles and strategies into all policies, and stakeholder engagement are among the key health policy objectives and the greatest challenges of the current decade. The contemporary health policy tends towards the use of down-top models, which are based on networking, partnerships of various forms and structures, and cooperation based on consensus and dialogue rather than hierarchical management, orders or instructions. Based on networks and cross-sectoral collaboration, such health policy arrangement actually demands for new management, work organisation and health care delivery models that would encourage stakeholder engagement in health decision-making and development processes, formation of health and cultural values through principles of accountability and transparency, and development of high-quality health care services[370].

It was already back in 2005–2006, that the European e-Health IMPACT study which investigated the economic effect of ICT on health policy and related benefits determined that e-health implementation in EU members states was one of the most important strategic resources in helping to solve most of the above-listed challenges particular to the modern healthcare policy as well as to suggest new work organisation and healthcare service delivery forms[371]. Still, the EU communication on *eHealth Action Plan*

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[370] Pukinaitė V. „Factors Affecting the Successful Implementation of Health in All Policies (HiAP): the Case of Tobacco Control Policy in Lithuania. *Health Policy and Management.* 2014, 1(6): p. 20–38.

[371] Empirica et al. Study on Economic Impact of eHealth: Developing an Evidence-Based Context-Adaptive Method of Evaluation for eHealth. 2005 [interactive]. [accessed 07-11-2014]. <http://www.ehealth-impact.org/download/ documents/D6_2_Final_Report_ext.pdf>.

2012–2020 – Innovative healthcare for the 21st century underlines that effective use of ICT in healthcare products, services and processes; change in healthcare systems and new skills; safe cooperation between institutions in the field of ICT and support to communication between patients and health care specialists remains a significant challenge both abroad and in Lithuania[372]. According to the words of Estonia's President Toomas Hendrik Ilves, despite of the progress achieved by EU Member States, implementation of IT solutions and projects in the healthcare sector is still lagging at least ten years behind other sectors[373]. Based on the data of a study conducted by the European Commission in 2011, to date almost all EU member states already had detailed national documents describing specific e-health aims and implementation measures with some countries even providing descriptions of rather advanced achievements in the field. However, up-close analysis of such specific e-health projects as e-prescription, telemedicine and electronic health records demonstrated that most of investigated members states (20 out of 27) were still in the stage of planning rather than implementation of e-health projects[374].

In cooperation with Oxford University, Bloch, Blumberg, and Laartz conducted the analysis of more than 5400 large scale (and large budget) IT projects implemented in various sectors. They determined that the planned budget of large-scale IT projects grows by the average of as many as 45 per cent during implementation, while project delays amount to 7 per cent and the created value falls by 56 per cent shorter than expected[375]. Projects that design, implement and adapt software (which is also particular to e-health

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[372] EU Communication on eHealth Action Plan 2012 – 2020 – Innovative Healthcare for the 21st Century. Brussels, 2012 12 06 COM(2012) 736 final [interactive]. [accessed 16-09-2014]. <http://ec.europa.eu/health/ehealth/docs/com_ 2012_736_lt.pdf>.

[373] eHealth Task Force Report. Redesigning Health in Europe for 2020. Publications Office of the European Union, Belgium, 2012, ISBN 978-92-79-23542-9 [interactive]. [accessed 07-11-2014]. <http://ec.europa.eu/information_society/activities/health/policy/ehtask_force/index_en.htm>.

[374] Stroetmann K. A., Artmann J., Stroetmann V. N., Protti D., Dumortier J., Giest S., Walossek U., Whitehouse D. European Countries on their Journey towards National E-health Infrastructures. Final European progress report. Brussels, 2011.

[375] Bloch M., Blumberg S., Laartz J. Delivering Large-Scale IT Projects on Time, on Budget and on Value. Insights & Publications, 2012 [interactive]. [accessed 07-11-2014] <http://www.mckinsey.com/insights/business_technology/delivering_largescale_it_projects_on_time_on_budget_and_on_value>.

projects) are among the riskiest in terms of exceeded expenditure as well as delays. The study demonstrated that IT projects that exceed the planned costs and fall behind the schedule frequently get dropped without full implementation[376].

Therefore, although e-health accentuates the technological determinism, it is not a measure that materialises by itself or a method that automatically guarantees improved healthcare policy results and significant improvement of health indicators. Development and implementation of e-health is an incredibly complex process; besides, it has a number of paradoxes: despite the considerable efforts – the continuously increased funding, new EU and national regulations and laws, new programmes and projects – patient satisfaction with healthcare services shows only a slight increase, e-health services remain underused compared to the level of awareness[377], and large inequalities persist among countries as well as regions (significant differences among e-health achievements of the Baltic States, where Estonia is undoubtedly the leader of the region[378]). According to Heeks, aiming to determine the key preconditions as well as obstacles for e-health and to focus on identification and engagement of stakeholders, more attentions should be given to the analysis of e-health projects (*micro* and *meso* levels).[379] Hence the need to analyse e-health in terms of the international experience and scientific research carried out in Lithuania and around the globe (*macro* level) as well as "understand the current reality and context", i.e. functionalities of e-projects implemented in a country. The above-mentioned international study on the economic impact of ICT in healthcare also suggests that aiming to define factors of e-health success or failure, determine the effect of e-health on stakeholders or undertake an economic assessment of e-health, it is important to analyse national and

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[376] *Ibid.*

[377] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V., Mačiulienė M. *Scale and Trends of the Inclusion and Participation of Citizens and Health Care Workers in e-Health in Lithuania.* An academic study. Vilnius: Mykolas Romeris University, 2014, p. 183-214.

[378] Stroetmann K. A., Artmann J., Stroetmann V. N., Protti D., Dumortier J., Giest S., Walossek U., Whitehouse D. European Countries on their Journey towards National E-health Infrastructures. Final European progress report. Brussels, 2011.

[379] Heeks R. The e-Government for Development Information Exchange project. The University of Manchester Institute for Development Policy and Management 2008 [interactive]. [accessed 07-11-2014]. <http://www.egov4dev.org/health/techniques>.

regional e-health projects that have already been implemented and/or are currently in the stage of implementation[380] (**Figure 3.1**).

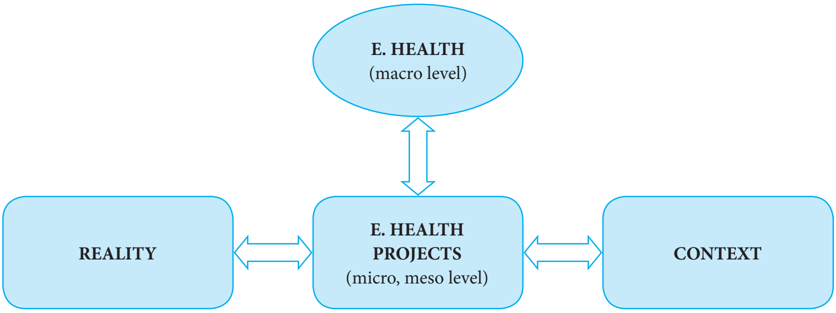

Figure 3.1. Significance of the analysis into e-health projects[381]

Therefore, this chapter **aims** to review and undertake the comparative analysis of the key Lithuanian projects related to e-health for the period 2004–2015 (including the projects with the planned closure in 2015 as per the Programme on the Development of eHealth System of the Republic of Lithuania for 2009–2015). The chapter also aims to disclose the environment (context and "reality"), in which projects were formed; present aims of e-health projects; name target groups, project promoters, partners and other stakeholders; identify key sources of funding; list names of IT companies that won public tenders for project implementation; and investigate the status of projects and implementation timescales.

Methods

This chapter is based on the summary and inquiry into the scientific literature and research, laws and other pieces of national and EU legislation. Analysis and comparison of projects delivered in the period 2009–2015 were based on the investigation of secondary information sources as well as the content of the website www.esparama.lt. The content analysis was chosen considering the fact that the tool "Map of Projects" offered by web-

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[380] Empirica et al. Study on Economic Impact of eHealth: Developing an Evidence-Based Context-Adaptive Method of Evaluation for eHealth. 2005 [interactive] [accessed 07-11-2014]. <http://www.ehealth-impact.org/download/ documents/D6_2_Final_Report_ext.pdf>.

[381] Heeks R. The e-Government for Development Information Exchange project. The University of Manchester Institute for Devepolment Policy and Management 2008 [interactive] [accessed 07-11-2014]. <http://www.egov4dev.org /health/techniques>.

site www.esparama.lt is the most convenient way to collect data on projects that have already been implemented or are in the stage of implementation in Lithuania. No information about e-health projects delivered prior to 2009 had to be made publically accessible; therefore, additional project search and analysis was delivered following the priorities of the Lithuanian Single Programming Document for 2004–2006, namely, the Measure 1.4. Restructuring and Upgrading of Healthcare Institutions, the Measure 3.3. Development of Information Technologies Services and infrastructure and the Measure 5.1. Support for Programme Management, Implementation Monitoring and Control (ERDF). Moreover, the analysis also focused on projects that have an impact on e-health while having no direct connection with it.

During the analysis, projects were grouped into separate profiles to record all of the collected information and to detail e-health projects as per selected values (**Table 3.1**). In addition, information on public procurement procedures related to the key e-health projects was systematised and detailed, providing: titles of the tenders, lists of applicants, successful tenderers that delivered e-health projects or implemented information systems, and contractual prices. This exercise faced the lack of information. To fill the gaps, official requests were sent to the Ministry of Health and the Public Procurement Office of the Republic of Lithuania, and state audit reports of the National Audit Office of Lithuania were analysed.

Table 3.1. Sample of an e-health project profile

Name of the project/initiative
The key aim and short description of additional aims
Project promoters/Applicants
Partners/Stakeholders
Public procurement information: the title of the tender, applicants, successful tenderer that delivered e-health projects or implemented information systems, contractual price
Beginning and end of the project (duration for implementation)
Status
Source of funding, amount
Other additional information

It is important to mention that the overview of e-health projects was not conducted in isolation. Data collection and analysis were interactive and aimed to ensure a continuous process, in which collection, demonstration and reduction of data as well as drawing and testing of conclusions were performed going back to primary stages and filling the data (the process is illustrated in **Figure 3.2**).

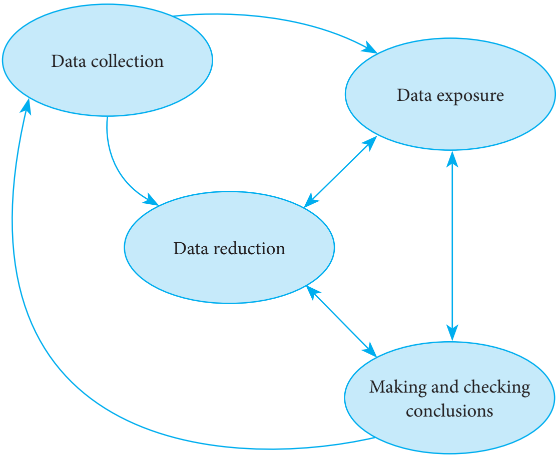

Figure 3.2. Interactive model for data analysis[382]

3.1. Development of the e-health system in Lithuania: the context and preconditions for e-health projects design

As suggested in previous chapters of this monograph, e-health, which in the wider sense defines the use of modern information and communication technologies (ICT) in organisation and delivery of uninterrupted patient-centred healthcare services, is an integral part of healthcare. Back in 2007, the Lithuanian e-Health System Development Strategy for the period 2007–2015 accentuated that "e-health has an impact on the entire healthcare": from service provision to health policy management with the help of

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[382] Morkevičius V., Telešienė A., Žvaliauskas G. Computerized Qualitative Data Analysis with NVIVO and Text Analysis Suite. Sample methodological study training package. Lithuania HMS data archive, 2011 [interactive]. [accessed 07-06-2014]. <http://www.lidata.eu/en/index.php?file=files/mokymai/NVivo/nvivo.html&course_file= nvivo_literatura_I_II.html>

modern ICT[383]. E-health improves accessibility of public health information, promotes health maintenance among citizens, allows a more effective use of available resources in the provision of healthcare services, boosts the development of new services based on modern ICT, enhances the quality of services, and stimulates the development of a greater economic and social value of health. E-health constantly supports the developing healthcare system, contributing to the continuity of health care changes[384].

Both globally and in Lithuania, e-health may be helpful in neutralising a rather problematic balance between the demand and supply (**Figure 3.3**). With emerging epidemiological changes, increasing average life expectancy, persisting significant social exclusion, deteriorating environmental quality (climate change, pollution, use of chemical substances), spreading consumerist attitude (health care services are perceived just as any other service, and the competition for the provision of healthcare services is growing at the level of Member States), and emerging new opportunities for scientific and medical innovations, healthcare faces growing patient expectations.[385] Nevertheless, other issues – such as the problem of medical staff distribution, the use of new methods, dissemination of professional knowledge, training of specialists, and the growing need for funding – remain just as important.

Therefore, e-health does not only change healthcare institutions, their internal structures, internal and external management processes, and healthcare systems (in other words, *the supply*) but also demands, expectations and needs of residents, patients, healthcare specialists, healthcare service providers, administrators and politicians (or *the demand*). On the one hand, healthcare professionals and service providers can use e-health and the tools to improve the quality, efficiency, effectiveness, and economy. Furthermore, e-health enhances possibilities to satisfy the growing demand and achieve more with fewer resources. On the other hand, through improved transparency and access to services as well as information, effec-

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[383] The Lithuanian e-Health System Development Strategy for the Period 2007–2015, approved by the Lithuanian Minister of Health. Order No. 2007-10-09. V-811.

[384] *Ibid.*

[385] Final Report on the Strategic Evaluation of Lithuanian Health Sector Priorities for the EU Structural Funds Programming Period 2014–2020, 2013 m. January 30 d. Vilnius, [interactive]. [accessed 07-06-2014] <http://www.esparama.lt/es_parama_pletra/failai/fm/failai/Vertinimas_ESSP_Neringos/Ataskaitos_2011MVP/Sveik_sekt_prioritetu_2014-2020m_ES_struk_paramos_panaud_vertinimas.pdf>.

tively used e-health empowers patients and promotes social and economic inclusion. Hence, in conclusion, e-health is the most advanced solution for the management of healthcare supply and demand[386].

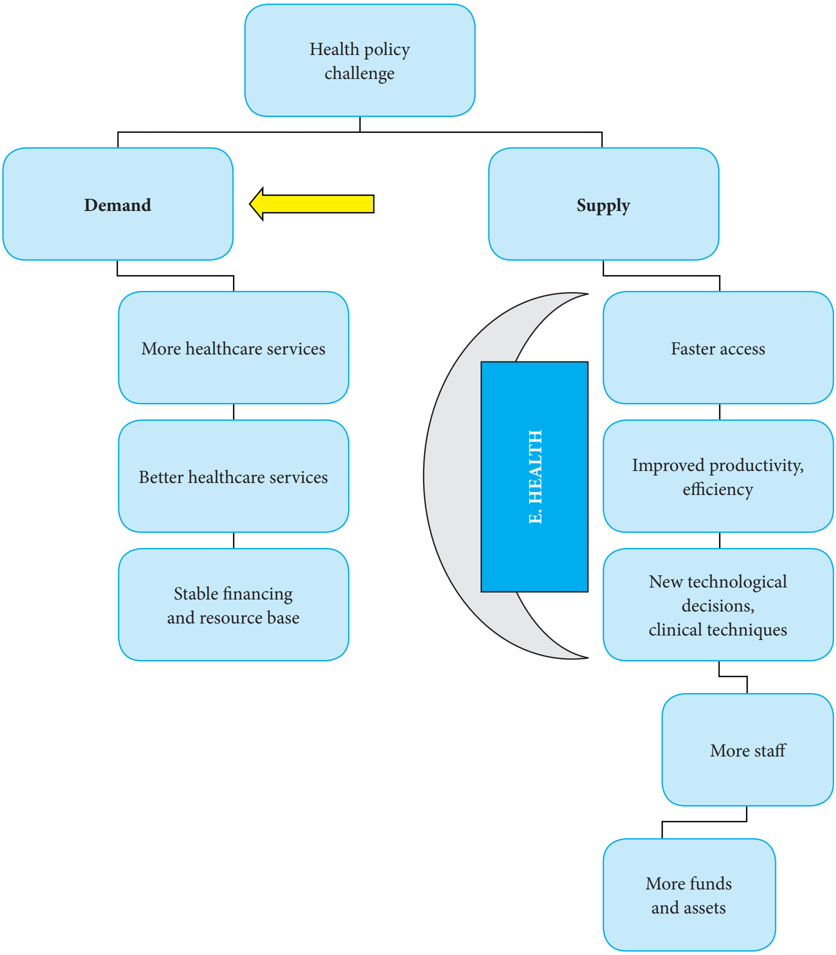

Figure 3.3. Problems particular to supply and demand of the modern healthcare policy and the situation of e-health[387]

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[386] EU communication on eHealth Action Plan 2012–2020 – Innovative Healthcare for the 21st Century. Brussels, 2012 12 06 COM(2012) 736 final [interactive]. [accessed 16-09-2014]. <http://ec.europa.eu/health/ehealth/docs/com_2012_736_lt.pdf>.

[387] Empirica et al. Study on Economic Impact of eHealth: Developing an Evidence-Based Con-

Although more than twelve years passed since the commencement of the development of e-health information system, (the basis for the development of the national e-health information system NESS was set following the Action Plan for the Lithuanian Government Programme for 2000–2004; and NESS design was initiated by the Minister of Health on 30 July 2002, with the signing-off of the Programme for the Development of the National Health Information System. It was this Programme in particular that envisaged the design of the long-term e-health strategy[388]), a number of reports by the National Audit Office of Lithuania (of 2006, 2008 and 2011) mention that healthcare services have been transferred to the electronic space by the initiative of large public and private healthcare institutions; meanwhile, the Ministry of Health that commenced with e-health development efforts in 2000 (when e-health development in Lithuania was supported by World Bank funds) was not showing the expected results[389]. At the time, the key national e-health projects were still under implementation (in 2005, the contract was signed with the private company *Hewlett-Packard* for the NESS-1 stage: the design of the NESS core and four key functions; and in 2007, NESS-2 project – the next NESS development stage – commenced with the signing of the contract with the private company *Etnomedijos Intercentras* for the development of eleven national e-health functions); however, they had to face a wave of empirical pessimism caused by the disappointment with the entire e-health system and doubts in its possible operation in Lithuania.

In 2005–2007, attempts to design NESS (NESS-1 project) faced difficulties, most of which were named in the 2008 report of the National Audit Office report of 2008, which assessed the overall control of information systems of the Ministry of Health. This seems to be the only accessible source of information regarding the attempted establishment of the national e-health system in Lithuania. This report states the Ministry of Health started designing NESS without previously drafting an official position document

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text-Adaptive Method of Evaluation for eHealth, 2005 [interactive]. [accessed 07-11-2014]. <http://www.ehealth-impact.org/download/documents/D6_2_Final_Report_ext.pdf>.

[388] The General Evaluation of Lithuanian Ministry of Health Information System. The Development Audit of Electronic Health Information Systems. The public audit report no. IA-9000-6-2, National Audit Office of Lithuania, 2008-02-29.

[389] Electronic Health Information System Development and the Implementation of Audit Recommendations. The public audit report no. VA-P-90-2-10, National Audit Office of Lithuania, 2011-06-30.

detailing the organisational, information and functional structure (IS manager and administrators), sources of data to be accumulated and other information describing the planned IS[390]. Besides, NESS implementation plan was only mentioned in the NESS feasibility study, which envisaged implementation in 5 stages and on different levels, and the funding had to come from different sources: the World Bank, EU support, and the Lithuania national budget[391]. However, the report of the National Audit Office of Lithuania stated that "most of NESS-1 implementation stages were delayed, some results weren't fully achieved; no articles of association for NESS were drafted or approved; NESS-1 project had no quality assurance or points of control; and no opportunities were created for stakeholder engagement in the project implementation process"[392]. Although NESS-1 was accepted from the service provider as an implemented project, the NESS core and four priority functions weren't piloted in either of the planned institutions but only in one additionally selected primary health care centre Širvintų *PSPC* (originally, the plan was to pilot the NESS-1 project in twenty-one institution)[393]. Auditors also noted the lack of competence among project executors, mismatch between project aims and available legal framework, unregulated legal environment, in which e-health of Lithuania was developing, and inadequacy of parties charged with the responsibility for the project[394].

NESS-2 stage (that aimed to develop 11 NESS functions and automated e-health systems for internal processes of healthcare institutions in three regions – Vilnius, Kaunas and Klaipėda) was mostly funded by the EU Structural Funds and undertaken in the period 2006–2008[395]. The develop-

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[390] The General Evaluation of Lithuanian Ministry of Health Information System. The Development Audit of Electronic Health Information Systems. The public audit report no. IA-9000-6-2, National Audit Office of Lithuania, 2008-02-29.

[391] The Lithuanian e-Health System Development Project in the Lithuanian Health Sector (feasibility study), approved by the Lithuanian Minister of Health 2005-03-15.

[392] The General Evaluation of Lithuanian Ministry of Health Information System. The Development Audit of Electronic Health Information Systems. The public audit report no. IA-9000-6-2, National Audit Office of Lithuania, 2008-02-29.

[393] *Ibid.*

[394] *Ibid.*

[395] Electronic Health Information System Development and the Implementation of Audit Recommendations. The public audit report no. VA-P-90-2-10, National Audit Office of Lithuania, 2011-06-30.

ment of eleven NESS functions sparked a dispute between the service provider and the Ministry of Health, which ended up in court with litigations being still in the process. Still, this did not prevent the implementation of the *e-Health Services* project, which aimed to develop a common nationwide system for e-health and health records, which was to be based on international standards[396]. The *e-Health Services* project was intended for large health care institutions (Kaunas Clinics, Klaipėda University Hospital, and Vilnius University Hospital Santariškių Clinics): the development of e-health functionality and HIS (Hospital Information System), and setting up of workplaces for clinicians[397]. In the 2011 report on the enlargement of the e-health information system and implementation of audit recommendations, the National Audit Office states that although eleven functions of the national e-health IS weren't developed, the Ministry of Health in cooperation with Vilnius University Hospital Santariškių Clinics, Kaunas Clinics, Klaipėda University Hospital managed to accomplish successfully the project aims with the help of other means. These efforts resulted in operational systems that can be used by patients[398].

Practically unimplemented and stuck, NESS (projects NESS-1 and NESS-2) has led to the new stage of the Lithuanian e-health system development. In 2009, the private company *Ernst &Young Baltic* was commissioned by the Ministry of Health to conduct *a Study on the novelty and suitability of the national e-health system, and development of consultations*. The study found that "considering the new model of the systems' architecture (the Electronic Health Services and Cooperation Infrastructure Information System), there seems to be almost no possibility to use NESS as the result of earlier design and implementation attempts; or there is only a very slim chance to use documents, knowledge and products"[399]. As a result, al-

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[396] *Ibid.*

[397] Final Report on the Strategic Evaluation of Lithuanian Health Sector Priorities for the EU Structural Funds Programming Period 2014–2020, 2013 m. January 30 d. Vilnius, [interactive] [accessed 07-06-2014] <http://www.esparama.lt/es_parama_pletra/failai/fm/failai/Vertinimas_ESSP_Neringos/Ataskaitos_2011MVP/Sveik_sekt_prioritetu_2014-2020m_ES_struk_paramos_panaud_vertinimas.pdf>.

[398] Electronic Health Information System Development and the Implementation of Audit Recommendations. The public audit report no. VA-P-90-2-10, National Audit Office of Lithuania, 2011-06-30.

[399] *Ibid.*

most ten years since the first attempt to design the e-health IS in Lithuania, it was started afresh in 2011.

On 28 March 2011, the Minister of Health issued the order approving the functional, hardware and software architecture model of Lithuanian e-health system. Aiming to link various data registers, accumulate electronic health records of patients, use e-prescription functions, store and use the database of medical images and signals, this model is intended to ensure the planned development of the e-health system as well as national coherence of all tools of the e-health system[400]. This document also describes measures for implementation of the Lithuanian e-health system (the fundamental measure for the implementation of the Lithuanian e-health system – "the universe of organisational, technical and software measures and databases of the Lithuanian healthcare system, aimed at a centralized creation, use and accumulation of personal electronic health records and to ensure the exchange of such information among health care institutions, medical professionals and other staff" – the Electronic Health Services and Cooperation Infrastructure Information System (ESPBI IS)[401]), the key functionality of ESPBI IS as well as recipients and providers of e-health services[402]. Later, on 7 June 2011, the *Seimas* of the Republic of Lithuania passed the amendment of the Law on the Health System[403], which also officially established the Lithuanian e-health system. According to the report of the National Audit Office, no legislative acts directly regulating the e-health system and electronic processing of health care data existed in Lithuania prior to this date[404]. And so, since 2011, ESPBI IS became the official national information system and the fundamental measure for the implementation of the Lithuanian e-health system. Implementing the Programme on the Development of eHealth System of the Republic of Lithuania for 2009–2015, in addition to ESPBI IS,

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[400] Order No. V-294 issued by the Minister of Health "Functional, Hardware and Software Architecture Model of Lithuanian E-Health System", 2011 March 28, Official Gazette, 2011, no. 38-1834.

[401] *Ibid.*

[402] *Ibid.*

[403] The Health System Law of the Republic of Lithuania Supplement of Article 2, 2011 June 7. No. XI-1432. Official Gazette, 2011, No.74-3541.

[404] Electronic Health Information System Development and the Implementation of Audit Recommendations. The public audit report no. VA-P-90-2-10, National Audit Office of Lithuania, 2011-06-30.

two national e-health sub-systems are being developed: one for electronic prescriptions and another – MedVAIS – for the archive of medical images (x-rays etc.). More information about the key national and regional e-health development projects is provided in other chapters of this monograph[405].

Summarising the context of the national e-health system development in Lithuania as well as the period from 2005 to 2009 (stages NESS-1 and NESS-2), the primary causes of failure can be identified: inaccurate and exceptionally complicated aims; project content problems, e.g. changing requirements or technical complexity; insufficient skills and competencies of project executors or the team; implementation problems, e.g. unrealistic implementation timescales; the lack of legislative and regulatory documents as well as the fragmented e-health system. All of these problems were encountered by the NESS-1 project for the design of the NESS core and four key functions. NESS-2 project faced them as well, even though in a somewhat smaller and different scope. The analysis conducted by Bloch, Blumberg, and Laartz, which was already mentioned at the beginning of this chapter, suggests that such and similar reasons may determine the failure of large-scale IT projects[406]. According to Kizlaitis, NESS (NESS-1 project) implementation was not completed due to a number of key reasons. Firstly, there was no evident institutional leader that could have acted as the administrator and driver of the project, adjusting the course of project execution and implementation depending on circumstances. Secondly, just as any other IS, NESS had to be developed in the remits of specific professional competencies and possibilities. In the opinion of Kizlaitis, attempts to implement standards and technologies understood by only two people in the country are doomed to lead any project to failure[407].

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[405] Order No. V-151 issued by the Minister of Health "The Programme on the Development of eHealth System of the Republic of Lithuania for 2009–2015", 2010 February 22. Official Gazette, 2010-02-25, No. 23-1079.

[406] Bloch M., Blumberg S., Laartz J. Delivering Large-Scale IT Projects on Time, on Budget and on Value. Insights & Publications, 2012 [interactive] [accessed 07-11-2014]. <http://www.mckinsey.com/insights/business_technology/ delivering_large-scale_it_projects_on_time_on_budget_and_on_value>.

[407] Kizlaitis R. The Lessons of E-health Projects. Presentation at the conference "The Perspectives of Health System Development", 2014 October 28, Mykolas Romeris University, Vilnius [interactive]. [accessed 30-10-2014] <http:// ssvp2014.mruni.eu/wp-content/uploads/2013/10/Esveikatos-projektu-pamokos-Romualdas-Kizlaitis.pdf>.

Despite the criticism[408], the period from 2009 is marked by a rather active implementation of the Programme of the Development of eHealth System for 2009–2015, execution of the key national and regional e-health development projects, and various attempts to engage stakeholders (residents, patients, healthcare specialists, healthcare service providers, administrators and politicians, and IT companies) into the design process of documents and legislative acts as well arranged consultations. In the opinion of Dučinskas, Head of the e-Health Coordination and Implementation Division of the Ministry of Health, time since 2009 may be referred to as the breakthrough period of e-health, which finally pinned down the definition of e-health; redefined the establishment of the e-health system; approved the articles of association of ESPBI IS, which appointed the Ministry of Health as the manager of the system and the State Enterprise Centre of Registers – which has a strong information database and infrastructure – as the administrator; as well as designed and signed-off new architecture model of the e-health system[409].

Still, it should be mentioned that the current design and implementation process of the e-health system encounters rather complicated challenges. As underlined in the *Final report on the strategic evaluation of Lithuanian health sector priorities for the EU Structural Funds programming period 2014–2020*, the current environment is either insufficient or incompletely beneficial for management and organisation of the e-health system and provision of e-services; in the meantime, e-health projects get stuck for a number of reasons starting with insufficient human and organisational resources or funding issues and finishing with failure to share competencies, differences in attitudes of patients, citizens and healthcare specialists or the lack of stakeholder engagement[410]. On the other hand, failure of NESS to

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[408] Electronic Health Information System Development and the Implementation of Audit Recommendations. The public audit report no. VA-P-90-2-10, National Audit Office of Lithuania, 2011-06-30.

[409] Dučinskas N. E-Health System Implementation Process in Lithuania. Presentation at the conference "The Perspectives of Health System Development", 2014 October 28, Mykolas Romeris University, Vilnius [interactive]. [accessed 30-10-2014]. <http://ssvp2014.mruni.eu/wp-content/uploads/2013/10/Naujas_DucinskasEsveikata-MRU-konferencijai-SAM.pdf>.

[410] Final Report on the Strategic Evaluation of Lithuanian Health Sector Priorities for the EU Structural Funds Programming Period 2014–2020, 2013 m. January 30 d. Vilnius, [interactive]. [accessed 07-06-2014]. <http://www.esparama.lt/es_parama_pletra/failai/fm/failai/Vertinimas_ESSP_Neringos/Ataskaitos_2011MVP/Sveik_sekt_prioritetu_2014-2020m_ES_struk_paramos_panaud_vertinimas.pdf>.

function prompted many healthcare institutions to use their own or EU funds to deploy different information systems; consequently, information is accumulated in various locations and data is rather fragmented. Integration of all data into one platform is undoubted among the most significant challenges of the current stage. Other problems and challenges, such as complete safety of information, confidentiality, assurance of integrity and reliability, effective management and implementation of e-health projects, management of staff during the implementation of e-health changes, are just as extensive and, therefore, time-consuming[411].

3.2. Funding of e-health projects: key funding sources and the role of the EU

Persistent development of e-health and continuity of e-health projects are among the key aims of the health care policy in the EU and Lithuania. This is also underlined in the *Final report on the strategic evaluation of Lithuanian health sector priorities for the EU Structural Funds programming period 2014–2020*, which states that considering international e-health projects that are currently implemented in Europe (e.g., EPSOS and Calliope) and the general trends of ICT development and the movement of services and people, it seems very likely that the period 2014–2020 will see extensive investments and funds allocated for further development of international and national e-health projects by additional new models or subsystems for specific diseases; or modernisation of healthcare services; and assurance of secure interstate exchange of aggregate data based on international standards[412]. However, effective assimilation of EU funds and provision of customers with more effective and better-quality services requires a consistent and productive operation of the national e-health system as well as timely implementation of e-health projects.

According to the EU communication on *eHealth Action Plan 2012–2020 – Innovative healthcare for the 21st century* provides information, in the programming period of 2007–2013 the European Regional Development Fund (ERDF) alone provided approx. EUR 15 billion to ICT priori-

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[411] *Ibid.*

[412] *Ibid.*

ties (or 4.4 % of total cohesion policy funds) for the 27 Member States[413]. Assessment of the EU Structural Funds used in Lithuania during that same programming period (2007–2013) shows that 3.5 per cent (approx. EUR 240 million) were committed for the sector of health[414]. Yet e-health projects, although truly expensive, did not receive the major support. Nevertheless, the *Final report on the strategic evaluation of Lithuanian health sector priorities for the EU Structural Funds programming period 2014–2020*, suggests that this "support from the EU Structural Funds received in the period 2007–2013 by healthcare institutions, associations of health professionals and research organisations that were either involved in research or strengthening the capacity of researchers in the field of health, amounted to LTL 1 920.6 million"[415]. Out of this support, personal and public healthcare institutions under administration of the Ministry of Health received 48 per cent of support; 25 per cent were committed to scientific research projects, 12 per cent – to renovation of buildings; 6 and 2 percent were allocated for e-health and public administration, respectively[416].

In Lithuania, e-health projects have not only been financed by the previously discussed and other EU Structural Funds, but also by the Compulsory Health Insurance Fund (CHIF), investment programmes of the Ministry of Health and other funds of the national budget; and a large portion was committed by healthcare institutions themselves. Just as the topic of e-health development, funding of the national e-health system has already been discussed in the first part of this chapter. The funding was organised in stages. The first major amount of support for the national e-health system (NESS-1 project) was provided by the World Bank (loan with grace periods was officially granted in 2000 and implementation commenced in 2005). In the 2008 state audit report, the National

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[413] EU communication on eHealth Action Plan 2012–2020 – Innovative Healthcare for the 21st Century. Brussels, 2012 1206 COM(2012) 736 final [interactive]. [accessed 06-09-2014]. <http://ec.europa.eu/health/ehealth/docs/com_2012_736_lt.pdf>

[414] *Final Report on the Strategic Evaluation of Lithuanian Health Sector Priorities for the EU Structural Funds. Programming Period 2014–2020*, 2013 m. January 30 d. Vilnius, [interactive]. [accessed 2014-06-07]. <http://www.esparama.lt/es_parama_pletra/failai/fm/failai/Vertinimas_ESSP_Neringos/Ataskaitos_2011MVP/Sveik_sekt_prioritetu_2014-2020m_ES_struk_paramos_panaud_vertinimas.pdf>.

[415] *Ibid.*

[416] *Ibid.*

Audit Office of Lithuania stated that a portion of the World Bank funds amounting to LTL 12 852 million was exclusively committed to the development of NESS (to ensure NESS functionality, carry out the contract and procure NESS equipment); and additional information technologies were procured for the amount of LTL 1 551 million during the implementation of projects for restructuring of healthcare institutions financed from the World Bank funds[417].

Details about sources of NESS funding and the planned course can be found in the feasibility study on the *Blueprint for the development of the e-health system in the sector of health of the Republic of Lithuania* approved by the Minister of Health on 15 March 2005. This document instructs to use the World Bank funds to draft NESS-1 procurement documents and contracts; CHIF funds – to run the system; funds to investment programmes of the Ministry of Health – to computerise institutions and train users; and funds of healthcare institutions – to improve the computer literacy of health care employees, computerise workstation and deploy of e-health systems in the institutions[418]. The analysis of funding sources for NESS should also consider the support of the EU Structural Funds for Lithuania in the period 2004–2006 that was provided following the Lithuanian Single Programming Document (SPD) for 2004–2006, which was signed-off by the Government of the Republic of Lithuania and the European Commission. In accordance with the Measure 3.3 *Development of Information Technologies Services and infrastructure* of the Priority 3 *Development of Productive Sector* of the SPD, funding was provided for the stage of NESS development, which had already been discussed in detail in the first part of this chapter (NESS-2 projects), more specifically, for the *e-Health Services* project, the implementation of which was provided with LTL 18 924 million since 2006 (the contract signed on 27 February 2006). In addition, following other SPD priorities and measures of that period, modernisation of healthcare institutions, as well as the development of information services and infrastructure, were also funded.[419]

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[417] The General Evaluation of Lithuanian Ministry of Health Information System. The Development Audit of Electronic Health Information Systems. The public audit report no. IA-9000-6-2, National Audit Office of Lithuania, 2008-02-29.

[418] *Ibid.*

[419] *Ibid.*

Once the development of ESPBI IS commenced and the new functional, hardware and software architecture model was approved or since the so-called breakthrough period of e-health in Lithuania (2009–2011), the plan was to ensure the development and further enlargement of e-health in Lithuania with the help of the EU Structural Funds (the new programming period of 2007–2013). The use of the EU Structural Funds was planned following the Economic Growth Operational Programme, Priority 3 *Information Society for All*, implementation measure No VP2-3.1-IVPK-10-V *e-Health Services* (according to this measure, funding was provided to national projects, such as projects for ESPBI IS infrastructure development as well as university-level and national projects for hospital information systems)[420]. According to the Economic Growth Operational Programme, Priority 3 *Information Society for All*, implementation measure No VP2-3.1-IVPK-11-R *e-Health Services: Regions*, funding is primarily committed to "IS projects of regional and district inpatient institutions and projects of district inpatient or outpatient institutions"[421]. All in all, LTL 101.3 million were planned from the EU Structural Funds and the state budget for national and regional e-health projects, out of which LTL 98.1 million were received from the EU.

In summary of the first and second stages of the NESS project in terms of funding sources and funds used for the national e-health system in Lithuania, LTL 17.036 million (or LTL 15.288 million without studies and consultations) were used for the development of e-health IS, procurement of technologies and consultancy services prior to 2008[422]. The total of LTL 34 million (including the project *e-Health Services* funded from the EU Structural Funds) was used for the development and further enlargement of the e-health system in Lithuania before 2011[423]. The sum committed for the current e-health period as well as implementation of national and regional

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[420] Order No. V-151 issued by the Minister of Health "The Programme on the Development of eHealth System of the Republic of Lithuania for 2009–2015", 2010 February 22. Official Gazette, 2010-02-25, No. 23-1079.

[421] *Ibid.*

[422] Electronic Health Information System Development and the Implementation of Audit Recommendations. The public audit report no. VA-P-90-2-10, National Audit Office of Lithuania, 2011-06-30.

[423] *Ibid.*

e-health service projects is almost three times greater than that of the NESS development; however, legislative, administrative and organisational conditions seem to be much more advantageous for an effective assimilation of funds and implementation of projects.

It should be noted that e-health projects were and still are funded by healthcare institutions. However, the 2008 state audit report of the National Audit Office of Lithuania indicates that the Ministry of Health has no detailed information about the funds of healthcare institutions used for the development of e-health[424]. Therefore, information on financial resources used by health care institutions should be sought in other sources and scientific research papers. E.g. the study *Scale and Tendencies of Stakeholder Involvement and Participation in E-Health Development in Lithuania* suggests that aiming to measure the scale of development, implementation and supply of e-health services in Lithuania, managers of health care institutions were requested to answer questions regarding the funding of e-health services[425]. The analysis of responses concerning the scale of funding revealed that more than a half of managers indicated allocating up to 5 per cent of their budget for e-health and only 3.9 per cent of healthcare institutions allocated more. In addition, as many as 15.6 per cent of respondents indicated that no allocations were made for e-health at all. The study also showed that managers mostly indicated the budget of their healthcare institution as the primary source of funding for the development of e-health and performance of related activities (74%); however, one-third of cases were also financed from the EU Structural Funds (*compared to managers of smaller healthcare institutions, a more frequent indication of EU Structural Funds or investment programmes as key funding sources was found among managers of large institutions (500–1000 employees).* It should also be mentioned that none of the managers of private healthcare institutions indicated the EU Structural Finds as a source of funding (although the analysis of e-health projects provided in later chapters of this monograph shows that private healthcare institutions were also active participants of Structural Fund

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[424] The General Evaluation of Lithuanian Ministry of Health Information System. The Development Audit of Electronic Health Information Systems. The public audit report no. IA-9000-6-2, National Audit Office of Lithuania, 2008-02-29.

[425] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V., Mačiulienė M. *Scale and Trends of the Inclusion and Participation of Citizens and Health Care Workers in e-Health in Lithuania.* An academic study. Vilnius: Mykolas Romeris University, 2014, p. 112-115.

projects, especially those implemented following the SPD of 2004–2004, Priority 1 *Development of Social and Economic Infrastructure*, Measure 1.4 *Restructuring and Upgrading of Healthcare Institutions*)[426].

3.3. Analysis of e-health projects of 2004–2009

As already mentioned in the introductory part of this chapter, aiming to define factors of e-health success or failure, determine the possible effect of e-health on stakeholders, undertake an economic assessment of e-health or analyse funding stages and funds allocated for the design and implementation of e-health, it is important to analyse e-health (or e-health related) projects. The design and implementation of NESS took place amid implementation of an extensive number of projects in the general sense related to the development of the e-health system in Lithuania, which aimed to modernise healthcare institutions as well as promote the development of information services and infrastructure. However, the key information sources provide almost no information on the first and second stages of NESS (NESS-1 and NESS-2 projects) in Lithuania (except for NESS-2 e-health project *e-Health Services*). This might have happened because it was only on 22 February 2010, that the *Order of the Minister of Health on the approval of the e-Health System Development Programme for 2009–2015*[427] was passed and since then all information regarding the EU Structural Funds and e-health projects for the period 2009–2015 has to be supplied on the website www.esparama.lt. No information had to be made publically available regarding e-health or related projects carried out before 2009. For this reason, while implementing the project *Integrated transformation of e-Health: perspectives of stakeholder network*, Mylolas Romeris University additionally carried out the search and analysis of e-health projects following the Lithuanian SPD for 2004–2006, Priority 1 *Development of Social and Economic Infrastructure*, Measure 1.4 *Restructuring and Upgrading of Healthcare Institutions*; Priority 3 *Development of Productive Sector*, Measure 3.3 *Development of Information Technologies Services and Infrastructure*; and Priority 5 *Technical Assistance*, Measure 5.1*Support for Programme*

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[426] *Ibid.*, p. 137

[427] Order No. V-151 issued by the Minister of Health "The Programme on the Development of eHealth System of the Republic of Lithuania for 2009–2015", 2010 February 22. Official Gazette, 2010-02-25, No. 23-1079.

Management, Implementation, Monitoring and Control (ERDF).

The primary purpose of the Lithuanian SPD for 2004–2006 Priority 1 *Development of Social and Economic Infrastructure* Measure 1.4 *Restructuring and Upgrading of Healthcare Institutions* is not only to "modernise the national healthcare infrastructure, rationalise the scope and structure of services provided, improve the quality of healthcare service and ensure regionally balanced access to healthcare considering the needs of patients (users)" as well as "to update medical equipment of healthcare institutions and introduce information technologies in healthcare institutions in order to ensure more efficient service provision"[428]. Ministry of Health is appointed as the intermediary institution in charge of this measure and the Central Project Management Agency – as the implementing institution. The Resolution of the Government of the Republic of Lithuania establishes "the maximum amount of funds, for which in 2006 assignment managers had the right to undertake liabilities by way of entering into contracts for implementation of projects supported by the EU Structural Funds and co-financing, following the Lithuanian SPD for 2004–2006 Priority 1 *Development of Social and Economic Infrastructure* Measure 1.4 *Restructuring and Upgrading of Healthcare Institutions*, is more than LTL 148 million".[429]

According to the analysis of projects related to e-health as per SPD for 2004–2006, Priority 1, Measure 1.4 *Restructuring and Upgrading of Healthcare Institutions*, as many as 122 healthcare institutions implemented different projects related to the Measure. Based on the *Order of the Minister of Health of the Republic of Lithuania on the additional support for projects funded from the European Regional Development Fund and co-financing following the Lithuanian SPD for 2004–2006 Measure 1.4 Restructuring and Upgrading of Healthcare Institutions* of 14 December 2007, as many as 20 projects (from analysed 122) were provided with more than LTL 1.8 million of additional support from the special ERDF programme (for the implementation of the SPD)[430].

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[428] Single Programming Document of Lithuania for the 2004 – 2006 period, issued by the Government of the Republic of Lithuania, 2004 August 2. Resolution No. 935. Official Gazette, 2004, No. 123-4486.

[429] The Resolution of the Government of the Republic of Lithuania No. 390, 2006 May 2, Vilnius.

[430] Order No. V-10233 of the Minister of Health of the Republic of Lithuania "On the Additional Support for Projects Funded from the European Regional Development Fund and

According to data collected regarding 122 projects implemented in healthcare institutions following the SPD Priority 1 Measure 1.4. *Restructuring and Upgrading of Healthcare Institutions*, project promoters comprised a wide spectrum of public healthcare institutions (e.g. Kybartai Primary Healthcare Centre), primary health care centres (e.g. Akmenė District Primary Healthcare Centre), various municipal outpatient clinics, centres and municipal administrations as well as personal enterprises (e.g. PE Office of the GPD Regina Gabrilavičienė) or private limited companies (e.g. PLC *Family Doctor of Rietavas*).

The earliest contract No. BPD2004-ERPF-1.4.0-02-04/0001-09 was signed with the project promoter (Public Institution Vilnius University Hospital Santariškių Clinics) on 30 November 2004, for implementation of the project *Decreasing cardiovascular morbidity and mortality among residents of eastern and south-eastern Lithuania by way of modernising and optimising the infrastructure of the healthcare system and provided services*. This project aimed "to modernise the infrastructure of the healthcare system in the eastern and south-eastern Lithuania, decrease morbidity, mortality and cardiovascular mortality among residents, prolong the average life expectancy and improve the quality of life"[431] and was implemented in as many as 40 healthcare institutions.[432] Analysis of the projects also revealed that many more contracts were signed with project promoters in 2006 compared to the year 2005. The latest contract under the SPD Measure 1.4. *Restructuring and Upgrading of Healthcare Institutions* was signed with project promoters the Municipal Outpatient Clinic of Biržai District and the Public Institution Rokiškis Primary Healthcare Centre on 6 December 2006.

Titles of analysed projects mostly contained such words as "modernisation" or "upgrading" and "improvement or the quality of services". According to the data collected from the analysis of 122 projects implemented in healthcare institutions under the SPD Priority 1 Measure 1.4. *Restructuring and Upgrading of Healthcare Institutions*, the projects mostly upgraded

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Co-Financing Following the Lithuanian SPD for 2004–2006 Measure 1.4 Restructuring and Upgrading of Healthcare Institutions", 2007 December 14.

[431] Order No. V-151 issued by the Minister of Health "The Programme on the Development of eHealth System of the Republic of Lithuania for 2009–2015", 2010 February 22. Official Gazette, 2010-02-25, No. 23-1079.

[432] *Ibid.*

medical equipment, deployed information technologies and, in some instances, developed the entire IT infrastructure, procured IT equipment, and equipped server rooms[433]. Thus, it may be concluded that most of the analysed projects were either e-health projects or projects directly related to e-health functions (**Table 3.2**).

Table 3.2. Summary of projects under the SPD for 2004–2006 Priority 1 Measure 1.4 Restructuring and Upgrading of Healthcare Institutions

Promoters of projects under the SPD for 2004–2006 Priority 1 Measure 1.4.	– Wide spectrum of project promoters – Not only public but also private healthcare institutions – In some instances, responsible municipal administrations
Signing of contracts for projects under the SPD for 2004–2006 Priority 1 Measure 1.4.	– The earliest contract signed on 20 November 2004 – Compared to 2005, more contracts were signed in 2006 – The latest contract signed on 6 December 2006
Aims and results of projects under the SPD for 2004–2006 Priority 1 Measure 1.4.	– Upgraded medical equipment – Deployed information technologies – Designed IT infrastructure – Procured IT equipment – Equipped server rooms

As many as two large-scale e-health projects were carried out under the SPD for 2004–2006, Priority 3 *Development of Productive Sector*, Measure 3.3 *Development of Information Technologies Services and Infrastructure*. The Information Society Development Committee under the Government of the Republic of Lithuania was appointed as the institution implementing the measure and assignment manager. The SPD for 2004–2006, Priority 3 *Development of Productive Sector*, Measure 3.3 *Development of Information Technologies Services and Infrastructure* had the overall amount of funds exceeding LTL 217 million and the two projects implemented under the measure were allocated more than LTL 25 million[434].

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[433] *Ibid.*

[434] The Resolution of the Government of the Republic of Lithuania No. 390, 2006 May 2, Vilnius.

According to the analysis of data of e-health projects under the Lithuanian SPD for 2004–2006 Priority 3 *Development of Productive Sector* Measure 3.3 *Development of Information Technologies Services and Infrastructure*, one of the largest-scale projects of the time entitled *e-Health Services* was financed and implemented under this measure. The contract number of the project *e-Health Services* was BPD2004-ERPF-3.3.0-02-04/0023-04; the project promoter – Ministry of Health of the Republic of Lithuania; the date of the contract – 27 February 2006; the contract value – more than LTL 15 million. As already mentioned in the first part of this chapter, the project *e-Health Services* seemed to be one of the parts of e-health system developed in the healthcare sector. The Programme for the Development of eHealth System for 2009–2015 says that "this project not only designed, implemented and started the use of hospital information systems at the Public Institution Kaunas University of Medicine Clinics, Public Institution Klaipėda University Hospital, Public Institution Vilnius University Hospital Santariškių Clinics (abbreviated as Santa-HIS, Kaunas Clinics and KUL HIS), but also significantly increased the number of computerised workplaces: 320 new computerised workplaces were provided in the Public Institution Kaunas University of Medicine Clinics, 243 – in the Public Institution Klaipėda University Hospital, and 246 – in the Public Institution Vilnius University Hospital Santariškių Clinics"[435].

The *Patient Appointment Reservation System* (contract number BPD2004-ERPF-3.3.0-01-04/0001, project promoter – the PI Vilnius University Hospital Santariškių Clinics, the contract start date – 7 July 2005) is yet another e-health project implemented under the Measure 3.3. *Development of Information Technologies Services and Infrastructure*. The project value – more than LTL 7 million. This project was nationally implemented by 19 partners (healthcare institutions). The project the *Patient Appointment Reservation System* developed a system for advanced patient registration that linked separate appointment systems of different healthcare institutions. The system provides patients with a possibility to book a time slot for a doctor's

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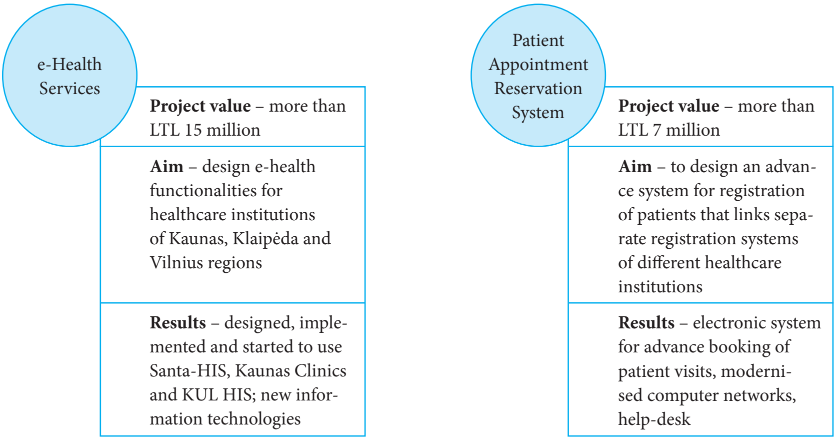
[435] Order No. V-151 issued by the Minister of Health "The Programme on the Development of eHealth System of the Republic of Lithuania for 2009–2015", 2010 February 22. Official Gazette, 2010-02-25, No. 23-1079.

appointment, choose health care professionals from various healthcare institutions, get informed (by a text or e-mail message) about the status of their visit, cancel the visit, and receive reminders. Meanwhile, doctors are given a possibility to undertake an advanced study of the patient data, compile a referral, and monitor the status of referred patient visits.[436] In addition, institution administrators can see the planned workload of doctors, patient distribution and receive automated statistical reports. The final result of the e-health project *Patient Appointment Reservation System* is not only the system itself, but also the modernised computer networks and a call centre that can be contacted by patients in need of consultations regarding the use of the system (**Figure 3.4**)[437].



e-Health Services

Project value – more than LTL 15 million

Aim – design e-health functionalities for healthcare institutions of Kaunas, Klaipėda and Vilnius regions

Results – designed, implemented and started to use Santa-HIS, Kaunas Clinics and KUL HIS; new information technologies

Patient Appointment Reservation System

Project value – more than LTL 7 million

Aim – to design an advance system for registration of patients that links separate registration systems of different healthcare institutions

Results – electronic system for advance booking of patient visits, modernised computer networks, help-desk

Figure 3.4. Summary of aims and results of e-health projects under the SPD for 2004–2006 Priority 3 Development of Productive Sector Measure 3.3 *Development of Information Technologies Services and Infrastructure*

Analysis of e-health projects should also consider the Lithuanian SPD for 2004–2006 Priority 5 *Technical Assistance* Measure 5.1 *Support for Programme Management, Implementation Monitoring and Control (ERDF).* Under this measure, a contract was signed on 29 December 2006 with the project promoter Ministry of Health of the Republic of Lithuania for the project Technical Assistance for the Ministry of Health of the Republic of

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[436] *Ibid.*

[437] *Ibid.*

Lithuania (project No. BPD2004-ERPF-5.1.0-03-06/0011-02). The value of the project financed by the EU Structural Funds amounts to more than LTL 300 thousand. Although the key aim of the project is to improve administrative capacity related to administration and management of Structural Funds, it is also related to e-health as it also seeks to ensure the execution of functions entrusted to the Ministry of Health as an intermediary institution implementing the Lithuanian SPD for 2004–2006 Measure 1.4 *Restructuring and Upgrading of Healthcare Institutions* as well as implementing the key objectives of the SPD Measure 5.1, i.e. to ensure the proper audit of the programme and the appropriate preparation and effective running of the programme[438].

In summary of key e-health and related projects of the first two development stages of the national e-health system under the Lithuanian SPD for 2004–2006 Priority 1 *Development of Social and Economic Infrastructure* Measure 1.4 *Restructuring and Upgrading of Healthcare Institutions*, Priority 3 *Development of Productive Sector* Measure 3.3 *Development of Information Technologies Services and Infrastructure* and Priority 5 *Technical Assistance* Measure 5.1 *Support for Programme Management, Implementation Monitoring and Control (ERDF)*, it should be said that a rather large number of public and private healthcare institutions used the opportunity to upgrade their medical equipment, deploy information technologies or develop the entire IT infrastructure. Special attention should also be given to the project *Decreasing cardiovascular morbidity and mortality among residents of eastern and south-eastern Lithuania by way of modernising and optimising the infrastructure of the healthcare system and provided services*. According to Kizlaitis, Director of Informatics and Development Centre of VUH Santariškių Clinics, this project revealed an immense source of additional investments for e-health and telemedicine – namely, investments of medical equipment producers into digitalisation and integration of their products into information systems – and helped to develop both the technical and specialist network for cardiology[439].

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[438] Single Programming Document of Lithuania for the 2004–2006 period, issued by the Government of the Republic of Lithuania, 2004 August 2. Resolution No. 935. *Official Gazette*, 2004, No. 123-4486.

[439] Kizlaitis R. *The Lessons of E-health Projects*. Presentation at the conference "The Perspectives of Health System Development", 2014 October 28, Mykolas Romeris University, Vilnius [in-

Data derived from the analysis of the first development stages of the national e-health system also allow concluding that partnership and co-operation are especially important for implementation of e-health projects and e-health services. Although a large number of partners is a great challenge, it is partners that promoted such projects as e-Health Services and the *Patient Appointment Reservation System*. On the other hand, according to Kizlaitis, to be implemented projects should raise not only "dreamlike" goals but also practical, easily achievable and clear benefits. Besides, they should continue for much longer and investments into IS should not finish together with the closure of a project[440].

3.4. Analysis of e-health projects developing the Lithuanian e-health system in 2009–2015

As already mentioned in earlier parts of this chapter, the period since 2009 finally pinned down the definition of e-health; redefined the establishment of the e-health system; approved the articles of association of ESPBI IS; as well as designed and signed-off new architecture model of the e-health system. Comparison of the current period with the period of NESS design and e-health projects implemented at that time, reveals a three-fold increase in funding for national and regional e-health projects. For their implementation, the total of LTL 101.3 million were allocated from the EU Structural Funds and the national budget following the Economic Growth Operational Programme Priority 3 *Information Society for All* implementation measures VP2-3.1-IVPK-10-V *e-Health Services* and VP2-3.1-IVPK-11-R *e-Health Services: Regions*. Based on information regarding the implementation of the Programme on the Development of eHealth System of the Republic of Lithuania for 2009–2015 as well as analysis of the content of the website www.esparama.lt (the content analysis was chosen considering the fact that the tool "Map of Projects" offered by website www.esparama.lt is the most convenient way to collect data on projects that have already been implemented or are in the stage of implementation in Lithuania), this part of the chapter will summarise and analyse national and regional projects for

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teractive]. [accessed 30-10-2014]. <http://ssvp2014.mruni.eu/wp-content/uploads/2013/10/Esveikatos-projektu-pamokos-Romualdas-Kizlaitis.pdf>.

[440] *Ibid.*

the development of the Lithuanian e-health system of 2009–2015 and other national projects related to or significant for e-health.

Currently, the *Programme for the Development of eHealth System of the Republic of Lithuania for 2009–2015* is implemented through 16 national e-health development projects. All national e-health projects have contracts for the implementation with differences in the level of their implementation, stage, and deadline. The data on the start and planned closure of national e-health projects (and deadlines specified in contracts) demonstrate that out of 16 national e-health projects, 5 have completely passed the implementation deadline, 9 are approaching the implementation deadline and 2 contracts are still ongoing (**Figure 3.5**). Nevertheless, Dučinskas believes that due to possible obstacles, such as prolonged public procurement procedures or belated entry into contract with service providers, all national e-health projects should be completed in the second quarter or 2015, when the use of systems and project maintenance should commence[441].

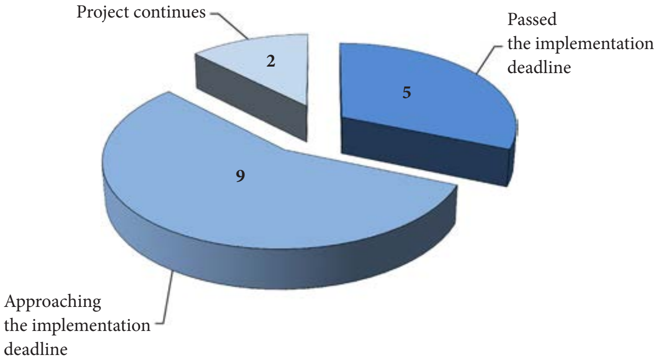

Figure 3.5. Implementation deadlines of national e-health projects

Three key national e-health projects (*Development of e-Health Services and Cooperation Infrastructure*; *Development of e-Service e-Prescription*; *Development of the National Medical Images Archive and Exchange IS and Related e-Services*) are centred on ESPBI IS and the development of two additional subsystems – e-Prescription and medical images archive Med-

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[441] Dučinskas N. E-Health System Implementation Process in Lithuania. Presentation at the conference "The Perspectives of Health System Development", 2014 October 28, Mykolas Romeris University, Vilnius [interactive]. [accessed 30-10-2014]. <http://ssvp2014.mruni.eu/wp-content/uploads/2013/10/Naujas_DucinskasEsveikata-MRU-konferencijai-SAM.pdf>

VAIS – of the national e-health system. The promoter of these projects is the Ministry of Health; however, the implementation is coordinated by a number of project partners: the Centre of Registers, the PI VUH Santariškių Clinics, Hospital of Lithuanian University of Health Sciences and the PI Kaunas University Hospital, and the National Health Insurance Fund under the Ministry of Health (profiles of key national e-health projects are provided in **Table 3.3**).

Table 3.3. Profiles of key national e-health projects

	Development of e-Health Services and Cooperation Infrastructure	***Development of e-Service e-Prescription***	***Development of the National Medical Images Archive and Exchange IS and Related e-Services***
Promoters/ Applicants	Ministry or Health of the Republic of Lithuania	Ministry or Health of the Republic of Lithuania	Ministry or Health of the Republic of Lithuania
Partners/ Stakeholders	Centre of Registers	Centre of Registers	PI VUH Santariškių Clinics, Hospital of Lithuanian University of Health Sciences, the PI Kaunas University Hospital, the National Health Insurance Fund under the Ministry of Health
Project start date and closure (implementation period)	Start date: 2011-11-07 Closing date: 2014-11-30	Start date: 2011-11-07 Closing date: 2014-11-30	Start date: 2011-11-07 Closing date: 2014-10-31
Status	Implemented/approaching date of closure	Implemented/approaching date of closure	Implemented/approaching date of closure

	Development of e-Health Services and Cooperation Infrastructure	***Development of e-Service e-Prescription***	***Development of the National Medical Images Archive and Exchange IS and Related e-Services***
Source of funding	OP2 *Economic Growth Operational Programme*, OP2-3 *Information Society for All*, VP2-3.1-IVPK-10-V *e-Health Services*	OP2 *Economic Growth Operational Programme*, OP2-3 *Information Society for All*, VP2-3.1-IVPK-10-V *e-Health Services*	OP2 *Economic Growth Operational Programme*, OP2-3 *Information Society for All*, VP2-3.1-IVPK-10-V *e-Health Services*
Project value	LTL 9.7 million	LTL 6 million	LTL 5.8 million

As the key national e-health projects implemented by the Ministry of Health – namely, *Development of e-Health Services and Cooperation Infrastructure*; *Development of e-Service e-Prescription*; *Development of the National Medical Images Archive and Exchange IS and Related e-Services* – have common and separate functions (functionalities), they should be analysed in greater detail.

The e-health project *Development of e-Health Services and Cooperation Infrastructure* focuses on (1) secure access for patients to personal electronic health records (EHR); (2) secure access for management of patient EHR and other e-health services for health professionals working in institutions that have no information systems of their own; (3) secure access to patient EHR and other e-health services for health professionals working in institutions that have information systems of their own, via the ESPBI IS data exchange subsystem; (4) national archiving and administration of medical images; and (5) administration of e-prescriptions[442].

The e-health project *Development of e-Service e-Prescription* aims to ensure the following possibilities: (1) to issue e-prescriptions for medicines and reimbursed medical aids; (2) centralised storage of e-prescriptions and access to e-prescriptions for pharmacies; (3) for the National

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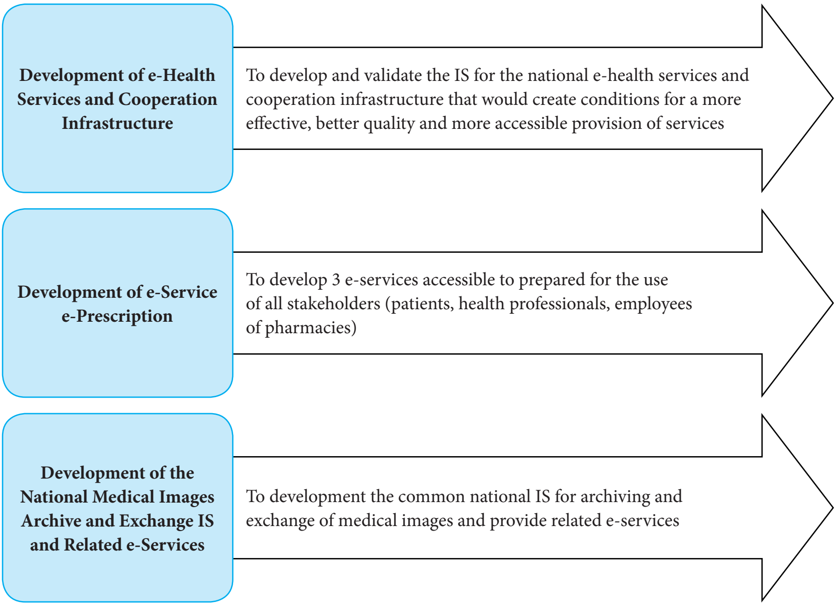
[442] Dučinskas N. E-Health System Implementation Process in Lithuania. Presentation at the conference "The Perspectives of Health System Development", 2014 October 28, Mykolas Romeris University, Vilnius [interactive]. [accessed 30-10-2014]. <http://ssvp2014.mruni.eu/wp-content/uploads/2013/10/Naujas_DucinskasEsveikata-MRU-konferencijai-SAM.pdf>.

Health Insurance Fund under the Ministry of Health to receive information from ESPBI IS regarding reimbursed pharmaceuticals dispensed at pharmacies; and (4) for patients to receive information from ESPBI IS regarding issued prescriptions and pharmaceuticals as well as dispensed medical aids[443].

The last of the three key national e-health projects – *Development of the National Medical Images Archive and Exchange IS and Related e-Services* – aims (1) to provide a possibility for healthcare institutions to transfer medical images to MedVAIS (central repository); (2) ensure long-term storage of medical images; (3) reduce the number of repeated procedures; and (4) use depersonalised data in research activities and studies[444]. (Aims and results of national e-health projects implemented by the Ministry of Health are provided in **Figure 3.6**).



Development of e-Health Services and Cooperation Infrastructure

To develop and validate the IS for the national e-health services and cooperation infrastructure that would create conditions for a more effective, better quality and more accessible provision of services

Development of e-Service e-Prescription

To develop 3 e-services accessible to prepared for the use of all stakeholders (patients, health professionals, employees of pharmacies)

Development of the National Medical Images Archive and Exchange IS and Related e-Services

To development the common national IS for archiving and exchange of medical images and provide related e-services

Figure 3.6. Aims and planned results of national e-health projects implemented by the Ministry of Health

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[443] *Ibid.*

[444] *Ibid.*

Analysis of aims and functionalities of the three e-health projects – *Development of e-Health Services and Cooperation Infrastructure*; *Development of e-Service e-Prescription*; *Development of the National Medical Images Archive and Exchange IS and Related e-Services* – from the stakeholder perspective allows stating that these projects will provide patients with a possibility to see and access all information related to healthcare service in a one location. In addition, they will ensure that each resident has a single electronic health record (EHR) as well as continuity or healthcare services and reduction of risk related to erroneous prescriptions[445]. Furthermore, health care institutions and professionals will be provided with a possibility to access detailed information about a patient faster and in real time, exchange data and standardised information more rapidly, and improve the control of health-related activities. It should be added that functionalities ensured by these projects will reduce duplication of health care services. As the *Presentation of ESPBI IS and e-Prescription Models* by *Ernst &Young Baltic* suggests, healthcare institutions will have "full access to common information systems, registers, and classifications of the healthcare sector"[446]. Such a stakeholder-centred approach aimed at the highest level of engagement, cooperation, and interinstitutional interaction should ensure interoperability of these key national e-health projects.

In terms of other thirteen national e-health development projects implemented following the Economic Growth Operational Programme Priority 3 *Information Society for All* implementation measure No. VP2-3.1-IVPK-10-V *e-Health Services*, the promoter is not the Ministry of Health but university hospitals and large healthcare institutions as well as the Lithuanian Medical Library, the State Healthcare Accreditation Agency, and the State Medicines Control Agency. Just as the three key national projects, some projects are carried out together with partner institutions, e.g. *PI Vilnius City University Hospital* is the promoter and *PI Republican Vilnius Psychiatric Hospital* and *PI Vilnius University Antakalnis Hospital* are partners in the project *Development of e-health services for residents and patients at PI Vilnius City University Hospital, PI Republican Vilnius*

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[445] Ernst & Young Baltic presentation on Ehealth, 2013-11-8.

[446] *Ibid.*

Psychiatric Hospital, and PI Vilnius University Antakalnis Hospital. The partnership principle is also planned for the project *Design of uniform classification of medical terms for high-quality development of e-health services in healthcare institutions (SNOMED*), which has the *PI Centro Polyclinic* as the partner of the promoter the Lithuanian Medical Library[447].

Aims and functionalities of e-health projects carried out by other institutions vary: from extension and modernisation of hospital information systems already deployed in large healthcare institutions, aimed at design of new functions and interfaces with SPBI IS; to installation of the classification and terminology system that covers all areas of modern medicine; or the register of licences issued to healthcare and pharmaceutical professionals; and the IS for licencing of healthcare institutions. In summary of the analysis of aims pertaining to national e-health development projects implemented by other institutions, a conclusion can be made that projects mainly consist of the following parts: design of new information systems; modernisation of already available information systems; integration of information systems with ESPBI IS; instalment of new additional functions and administration, management and planning tools; and the design of interactive electronic services[448]. Just as *Development of e-Health Services and Cooperation Infrastructure*; *Development of e-Service e-Prescription*; *Development of the National Medical Images Archive and Exchange IS and Related e-Services* – e-health projects implemented by the Ministry of Health, projects of other institutions have similar final aims: to focus more on patients; improve the quality of work and functions of staff working in healthcare institutions; to remove additional administrative burden; and achieve the highest level of electronic maturity, i.e. cooperation and interoperability (dossiers of thirteen national e-health development projects are given in **Table 3.4**).

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[447] Dučinskas N. E-Health System Implementation Process in Lithuania. Presentation at the conference "The Perspectives of Health System Development", 2014 October 28, Mykolas Romeris University, Vilnius [interactive]. [accessed 30-10-2014]. <http://ssvp2014.mruni.eu/wp-content/uploads/2013/10/Naujas_DucinskasEsveikata-MRU-konferencijai-SAM.pdf>.

[448] *Ibid.*

Table 3.4. Dossiers of thirteen national e-health development projects

No.	Promoters	Project title	Short dossier of the project
1.	Public Institution Vilnius University Hospital Santariškių Clinics (VUHSC)	Development of e-health services in healthcare institutions of Santariškės medical centre (the development of SANTA-HIS)	It is planned to modernise the uniform SANTA-HIS IS and extend it by new functions that are required in order to computerise computerisation of VUHSC branches: to modernise the existing and design new tools for patient registration as well as administration and management of clinical information and medical records; to modernise the existing and design new planning tools for hospitalisation, surgeries and other activities; modernise information management tools for laboratories, radiology and anaesthesia, and intensive therapy.
2.	Public Institution Vilnius University Hospital Santariškių Clinics	National clinical decision support system	The ESPBI IS interface designed during the project will provide healthcare professionals with a possibility to provide and at the same time receive information about a patient. The project will also develop the e-service Provision of test results, automated analysis of patient cases and suggested decisions, which will cover tools for diagnostics, treatment, patient referral and automated use of algorithms; analysis and interpretation of patient cases; analysis of radiologic examination and automated decisions; analysis of impulses and automated decisions; and information exchange with other IS.
3.	Public Institution Vilnius University Hospital Santariškių Clinics	Development of the Patient Appointment Reservation System	Public Institution Vilnius University Hospital Santariškių Clinics (VUHSC) and 19 other healthcare institutions from all over in Lithuania. A uniform system for registration of patient visits to healthcare specialists was installed in healthcare

No.	Promoters	Project title	Short dossier of the project
			institutions. Identification of a patient and doctor (VAIISIS); making of queues in case of no free time slots; e-assistant that helps to recognise symptoms of a disease, identify a problem and refer a patient to a required specialist as well as collect the preliminary anamnesis.
4.	Hospital of Lithuanian University of Health Sciences	Development of information systems in Hospital of Lithuanian University of Health Sciences and Klaipėda University Hospital	It is planned to modernise the already existing HIS of the two healthcare institutions. The HIS will supply and receive EHR data and health records to/from ESPBI IS; and patients will be able to connect to ESPBI IS portal and see data from their health records online as well as receive information about received healthcare services etc. The aim is to create a service for accumulation, administration, retrieval and supply of EHR information, data and documents for the staff of the healthcare institutions that provide healthcare services to a specific patient. To achieve the aim, it is planned to modernise HIS, procure required equipment and design e-services for patients.
5.	Hospital of Lithuanian University of Health Sciences	Use of telemedicine in cardiology in western Lithuania	The aim of the project is to contribute to high-quality telemedicine and cardiology services in western Lithuania (regions of Kaunas, Klaipėda, Šiauliai, Telšiai, Tauragė, Panevėžys, Marijampolė, and Alytus) by providing primary and secondary healthcare professionals with the information system for telemedicine services, and collection and exchange of cardiologic information as well as related e-services. The following results have been achieved: the system for accumulation and

No.	Promoters	Project title	Short dossier of the project
			analysis of patient data regarding cardiologic and other examination; integration between information systems for telemedicine and cardiology of the applicant, partner and beneficiaries as well as integration of the systems with ESPBI IS.
6.	Hospital of Lithuanian University of Health Sciences	Installation of e-services and tools for management of patient-related clinical information and medical processes of Kaunas Clinical Hospital	The project will produce an interface with ESPBI IS, which will allow healthcare professionals to supply and at the same time receive the required information about a patient. The designed e-services will be comprised of the following components: administration of patient flows; automated checking of compulsory health insurance status in real time; ordering of medical laboratory tests for patients and supply of results to specialists; ordering tests from Pathology Laboratory for tissues received during biopsy and surgeries; automated provision of patient records to ESPBI IS EHR; information exchange between Kaunas Clinical Hospital and the Disability and Working Capacity Assessment Office.
7.	Public Institution Vilnius University Hospital Žalgirio Clinic	Development of e-services for residents and patients at the Vilnius University Hospital Žalgirio Clinic and Vilnius University Emergency Hospital	Electronic accumulation, storage and supply of patient health records to patients and healthcare professionals. The developed IS will transfer the following services and administrative services to the electronic space: accumulation and storage of patient health records; administration of patients arriving for outpatient visits; administration of hospitalised patients; sorting of patients by urgency of required care; compilation of documents, forms

No.	Promoters	Project title	Short dossier of the project
			and statements with the help of IS; planning the use of hospital resources.
8.	Public Institution Vilnius City University Hospital	Development of e-services for residents and patients at the Vilnius City University Hospital, Republican Vilnius Psychiatric Hospital, and Vilnius University Antakalnis Hospital	The project will develop an interactive e-service for electronic accumulation, storage and supply of patient health records to patients and healthcare professionals. During the project applicant and partner institutions will be provided with the IS that will have 27 functions (21 of which will be modernised and 6 – newly designed). In addition, 310 workplaces will be computerised (133 in VCUH, 88 in RVPH and 89 in VUAH) and one hardware centre will be created for all three institutions.
9.	Public Institution Republican Šiauliai Hospital	Development of e-services for residents and patients at the Republican Šiauliai Hospital, Republican Panevėžys Hospital, Republican Klaipėda Hospital and Republican Kaunas Hospital	The project will develop an interactive e-service for electronic accumulation, storage and supply of patient health records to patients and healthcare professionals. This will be done to design the information system that corresponds to the aims set out in the National e-health system development strategy for 2007–2015. Institutions of the applicant and partners will be provided with information systems (modernised) that will ensure the provision of e-health services and smoother provision of healthcare services for patients. The planned results aim to ensure electronic accumulation and storage of patient health records; and provision of information contained in health records to patients and healthcare professionals of other institutions.

No.	Promoters	Project title	Short dossier of the project
10.	Public Institution Klaipėda Seamen's Hospital	Development of e-health services at Klaipėda Seamen's Hospital	The project will produce the IS that will allow the transfer of services and processes of the healthcare institution to the electronic space, namely: electronic accumulation and storage of patient health records; provision of information contained in health records to patients and healthcare professionals; planning and administration of outpatient visits.
11.	Lithuanian Medical Library	Design of uniform classification of medical terms for high-quality development of e-health services in healthcare institutions (SNOMED)	SNOMED CT is the system for terminology and classification that covers all areas of modern medicine. The system consists of 19 interrelated classifications for the codification of diseases, procedures, laboratory tests, pharmaceuticals and other medical aspects. The project aims to contribute to the development of high-quality e-services for patients in healthcare institutions of Lithuania by developing SNOMED CT – the integrated Lithuanian glossary of medical terms. It plans to translate 40 000 concepts. The project plans to provide health care professionals with an e-service for the use of international terminology in electronic health records.
12.	State Healthcare Accreditation Agency	E-services for licencing healthcare specialists and healthcare institutions	The project aims to develop the register of licences issued to healthcare and pharmaceutical professionals and the information system for licencing of healthcare institutions as well as related services.
13.	State Medicines Control Agency	Public e-services for licencing of pharmaceutical activities and provision of information on medicinal preparations	The project aims to develop and install VAPRIS and VPREG systems and transfer the following services to the electronic space: ordering of licences for pharmaceutical activity and related services; ordering of licences for activities involving

No.	Promoters	Project title	Short dossier of the project
			narcotic drugs and psychotropic substances and related services; import and export permits and related services; ordering a licence for a practicing pharmacist and related services; enrolment of pharmacist assistants into the list of pharmacist assistants and relates services; submission of reports by healthcare specialists regarding adverse drug reactions.

Installation, extension or modernization of information systems available at certain regional healthcare institutions are planned under the Economic Growth Operational Programme Priority 3 *Information Society for All* implementation measure No VP2-3.1-IVPK-11-R *e-Health Services: Regions*. Currently, thirteen regional projects for the development of the e-health system are implemented under the measure, which will link information systems in regions. These regional e-health projects are implemented by the following public institutions: Šeškinė Polyclinic, *Elektrėnai Hospital*, *Centro Polyclinic*, *Kaunas Šilainiai Polyclinic*, *Tauragė Hospital*, *Klaipėda University Hospital*, *Regional Hospital of Telšiai*, *Marijampolė Hospital*, *Alytus County S. Kudirka Hospital*, *Radviliškis Hospital*, *Utena Hospital*, *Regional Hospital of Rokiškis* and *Jonava Hospital*. Eleven regional e-health projects have almost an identical title, i.e. *Development of e-health services at healthcare (or personal healthcare) institutions of … region (naming the specific region)*. These regional projects have similar aims: with the help of modern information and communication technologies, create conditions for residents and patients of a certain region to receive high-quality and timely healthcare services; and for healthcare institutions and healthcare professionals that provide health care services – to cooperate and safely exchange information[449]. These projects should provide institutions of promoters and partners with IS that will have a different number of functions

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[449] Dučinskas N. E-Health System Implementation Process in Lithuania. Presentation at the conference "The Perspectives of Health System Development", 2014 October 28, Mykolas Romeris University, Vilnius [interactive]. [accessed 30-10-2014] <http://ssvp2014.mruni.eu/wp-content/uploads/2013/10/Naujas_DucinskasEsveikata-MRU-konferencijai-SAM.pdf>.

in different regions (e.g. in Marijampolė Region, the IS will have 25 functions). The value of analysed regional e-health projects varies from LTL 0.5 million to 2.5 million.

Other two regional projects for the development of the e-health system have different aims and functionalities planned. The PI Šeškinė Polyclinic is implementing the project *SANTA-HIS adjustment for the outpatient level*, the value of which is LTL 2 million. The project aims to extend and modernise SANTA-HIS IS by adjusting it for the primary care level as well as install it in all healthcare institutions participating in the project. In addition, it is planned to integrate the modernised SANTA-HIS IS into ESPBI IS. And the aim of the regional e-health project (with the value of LTL 1.5 million) implemented by the PI *Centro Polyclinic* on the *Electronic service for nursing at home and palliative care* is to ensure accessible, high-quality and timely personal healthcare services for patients that receive nursing services at home by providing mobile workplaces for nursing specialists and installing the electronic system for the management of nursing at home and palliative care services at public institutions Centro Polyclinic, Central Polyclinic of Vilnius Region and Nemenčinė Polyclinic of Vilnius Region.

Analysis of national and regional e-health projects of 2009–2015 should also consider other national e-projects that may either be related to e-health or have a significant impact on e-health. The additional analysis of other national e-projects revealed that projects with a different object, promoters and aims may have some aspects (e.g. information sharing and exchange or cooperation) that are directly or indirectly related to healthcare institutions, their information systems or e-services. E.g. the project implemented by the Residents' Register Service on *Electronic services for registration of civil status statement records and issuing of certificates* was mainly focused on the transfer of the services – registration of civil status statement records, issuing of certificates, and queries – to the electronic space; however, this project also had to create conditions for a more effective operation of procedures curated by healthcare institutions, namely, registration of births, deaths, marriages, divorces, changing of the given or family name etc. There is yet another project, which is important for the e-health system: the project implemented by the Hospital of Lithuanian University of Health Sciences on *Improvement of Lithuanian healthcare for pregnant women, women in labour and newborns*, which is financed by the programme for the cooperation of Lithuania and

Switzerland. The aim of the project is to develop a uniform computer database that would allow all Lithuanian healthcare institutions to accumulate and analyse data about a pregnant woman, a woman in labour or a newborn.

3.5. Summary

In summary, implementation of national e-health projects of 2009–2015 is firstly aimed at ensuring the operation of the Electronic Health Services and Cooperation Infrastructure Information System, which is the key measure for the implementation of the Lithuanian e-health system, and subsystems e-Prescription and medical images archive MedVAIS. The analysis of e-health projects also revealed other aims and functionalities, e.g. development of new IS and modernisation of the already available systems; installation of additional functions and, most importantly, integration of IS with ESPBI IS. Differently from national projects, regional e-health development projects are mostly focused on the development of regional IS and functions, later planning to link them on the level of regions (and finally integrating them into ESPBI IS or providing a possibility to have a link).

Assessment of the national, regional and other projects related to e-health of the current stage of e-health development in Lithuania from the standpoint of patients, healthcare specialists, healthcare service providers and administrators demonstrates that the majority of projects are focused on the highest possible level of cooperation, engagement and interoperability. Besides, from the point of view of stakeholders, successful implementation of 29 national and regional e-health projects described in this chapter would leave more time for patient treatment, quality assurance of treatment and reduction of errors. On the other hand, it would ensure a faster exchange of data regarding healthcare services provided to patients as well as tests and the course of treatment; provide a faster access to detailed information about a patient (available in a single locations) in real time; besides, less time would be given for medical documentation in healthcare institutions[450]. Successful implementation of these projects would contribute to the key aims of e-health: improvement of

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[450] Dučinskas N. E-Health System Implementation Process in Lithuania. Presentation at the conference "The Perspectives of Health System Development", 2014 October 28, Mykolas Romeris University, Vilnius [interactive]. [accessed 30-10-2014]. <http://ssvp2014.mruni.eu/wp-content/uploads/2013/10/Naujas_DucinskasEsveikata-MRU-konferencijaiSAM.pdf>.

the quality of services, more effective use of available resources in the provision of healthcare services, and greater economic and social value of health.

Comparison of the current situation with thoroughly analysed stages of NESS development and projects of 2005–2009 should consider the fact that currently implemented 29 projects have been contracted, procurement procedures hardware are taking place as well as system development activities, and the first testing stage of the integration with ESPBI IS has been finalised following the approval of the ESPBI IS architecture model. Still, just as during the first phases of the development of the e-health system, implementation of current e-health projects faces rather complex challenges. E-health projects get "stuck" due to a variety of issues such as the integration of data from healthcare institutions through one access platform, or insufficiency of human and organisational resources, or differences in opinions of patients, citizens and healthcare professional. Therefore, partnership, cooperation and stakeholder engagement are crucial in overcoming these challenges.

3.6. Case study: Experience of the Central Polyclinic of Vilnius in engagement of stakeholders in the development and installation of the electronic service for nursing at home and palliative care

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Development and installation of information systems (IS) in healthcare institutions demand for complex organisational measures aimed at detection of appropriate interactions between and configurations of human resources, information technologies (IT) of an institution, and suitable solution for dissemination of information during the development and installation of IS[451]. Researchers Lempinen and Rajala (2014) determined that IS development is based on staged social actions and relationships between different stakeholder groups involved in IS development and installation. It is important that development and installation of IS in personal healthcare institutions consider engagement and satisfaction of needs of stakeholders – healthcare

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[451] Lempinen H., Rajala R. Exploring multi-actor value creation in IT service processes. Journal of Information Technology. 2014, 29:170–185.

professionals (physicians, nurses, nursing assistants and others), administrators of health care institutions, IS administrators and patients. This ensures effective deployment of IS and, at later stages, guarantees the use of IS as tools that facilitate organisation of services. Analysis of stakeholder interactions in the development and installation of IS processes shows that healthcare institutions may use information systems (IS) to create added value of healthcare services.

Most research studies, especially those analysing the impact of IS on the creation of added value, show that modern IS must respond to the needs of all stakeholders, including clients, partners and other organisations, and unite them in joint efforts in the creation of added value of services[452]. Sarker et al. (2012) suggest that participation of stakeholders in the design of IS – a widely acknowledged principle that underlies the successful development of IS. However, stakeholders struggle to achieve an equal benefit from the deployed IS as different groups may have different aims and competencies[453]. Tasks related to the IS development encompass complex aspects as designed IS processes must integrate needs of different participants and correspond to technologic, organisational and financial resources of a specific institution[454]. It was determined that internal and external stakeholders of an institution have certain roles in the development and installation of IS or relocation of services to the electronic space[455]. Stakeholders represent various groups of people, including IT staff, users and managers of various levels; this ensures required human resources and capabilities required for the development and installation of IS. In terms of communication, changes in stakeholder groups create multifaceted social relationships and interactions that are particularly important for a successful IS development

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[452] Sarker S., Sarker S., Sahaym A. and Bjorn-Andersen N. Exploring Value Cocreation in Relationships Between an ERP Vendor and Its Partners: A revelatory case study. MIS Quarterly. 2012, 36(1): 317–338.

[453] Stucky S., Cefkin M., Rankin Y., Shaw B. and Thomas J. Dynamics of Value Co-creation in Complex IT Service Engagements. Information Systems & E-Business Management. 2011, 9(2): 267–281.

[454] Xia W. and Lee G.. Complexity of Information Systems Development Projects: Conseptualization and measurement development. Journal of Management Information Systems. 2005. 22(1): 45–83.

[455] Peppard J. Managing IT as a Portfolio of Services. European Management Journal. 2003, 21(4): 467–483.

based on aligned needs and resources of various stakeholders and ultimate satisfaction of their needs[456].

Lempinen and Rajala (2014) identified four key groups of stakeholders that participate in development of IS: IT specialists and IS users of an institution, managers-administrators that take decisions, and IS installers-suppliers:

- IT specialists of an institution assigned with the IS control function and provision of IT services in the entire institution[457]. There are some IS services, which are very important to IT professionals in most organisations, namely, possibilities to manage information and IT projects, develop and install programs, change IS, and maintain technologies and perform training. IT professionals of an institution are the group of stakeholders mostly interested in the development of these services[458].
- IS users are usually experts in their field; however, during IS development, they may have different needs, which may require specific additional skills and competencies. Researchers believe that IS user needs should be the focal point in the realisation of IT services or IS development; although, tasks cannot be performed without IT specialists[459]. IS users rather than system analysts are the best source of information about the future use of IS functionality. Consequently, the participation of an IS user is a must while striving for a successful development of IS services[460]. User participation in realisation of IS solutions is among the factors that determine success or failure of an IT project implementation. Due to these reasons, it

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[456] Lempinen H., Rajala R. Exploring multi-actor value creation in IT service processes. Journal of Information Technology. 2014, 29:170–185.

[457] Guillemette M.G. and Paré G. Toward a New Theory of The Contribution of The IT Function in Organizations. MIS Quarterly. 2012, 36(2): 529–551.

[458] Gordon S. R. and Gordon J. R. Organizational Options for Resolving the Tension Between IT Department and Business Units in the Delivery of IT Services. Information Technology & People. 2002, 15(4): 286–305.

[459] Stucky S., Cefkin M., Rankin Y., Shaw B. and Thomas J. Dynamics of Value Co-creation in Complex IT Service Engagements. Information Systems & E-Business Management. 2011, 9(2): 267–281.

[460] Yun Kyung C. and Menor L. J. Toward a Provider-Based View on the Design and Delivery of Quality E-Service Encounters. Journal of Service Research. 2010, 13(1): 83–95.

is of utmost importance to promote user participation in IS design as this ensures attribution of high value to IS instalment by the user[461].

- Charged with the decision-making responsibility, managers and administrators of an institution are key players in the process of design and deployment of IT services and IS[462]. Administrators of an institution (decision-makers) act on different levels of decision-making; e.g. head of a subdivision, head of a division, head of a department and, finally, head of the institution. Nevertheless, researchers recognise that decisions related to IS functionality should be made by a head in consultation with IT specialists in the possession of specialised knowledge[463].
- Cooperation between an IS installer-supplier and a client (a specific institution) is acknowledged as the key aspect of the entire IS development among all IS design and instalment stages[464]. IS installers-suppliers are regarded as experts that turn aims into a well-calculated and measurable result. Researchers draw our attention to the impact of cooperation and relationships between suppliers and recipients on the successful implementation of IT projects and realisation of e-services[465]. Heiskanen et al. (2008) suggested that relationships between an IS installer and a specific institution are a social process based on the participation of numerous actors[466].

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[461] Blazevic, V. and Lievens, A. Managing Innovation Through Customer Coproduced Knowledge in Electronic Services: An exploratory study. Journal of the Academy of Marketing Science. 2008, 36(1): 138–151.

[462] Armstrong, C.P. and Sambamurthy, V. Information Technology Assimilation in Firms: The influence of senior leadership and IT infrastructures, Information Systems Research. 1999, 10(4): 304–327.

[463] Peppard J. Managing IT as a Portfolio of Services. European Management Journal. 2003, 21(4): 467–483.

[464] Lee J.-N., Shaila M. M. and Kim Y.-M. IT Outsourcing Strategies: Universalistic, contingency, and configurational explanations of success. Information Systems Research. 2004, 15(2): 110–131.

[465] Vargo S.L. and Lusch R.F. Service-Dominant Logic: Continuing the evolution. Journal of the Academy of Marketing Science. 2008, 36(1): 1–10.

[466] Heiskanen, A., Newman, M. and Eklin, M. Control, Trust, Power, and the Dynamics of Information System Outsourcing Relationships: A process study of contractual software development. The Journal of Strategic Information Systems. 2008. 17(4): 268–286.

Researchers recognise that institutions of the public sector including healthcare service providers have many more stakeholders than businesses operating in the private sector. Stakeholder engagement is not only visible in decision-making related to management of an institution but also in the installation of information systems[467]. Stakeholders are: employees, service recipients, i.e. patients, providers of social services (e.g. social workers), public health specialists and representatives of the state and controlling institution, representatives of NGOs and others that have to cooperate in order to find the most suitable decision that would respond to challenges of the contemporary health system: integration of healthcare services; organisation and supply of healthcare services that are attributed to different levels; cooperation between a patient and healthcare specialists; shift from a disease centred model to a patient-centred healthcare service organisation and supply management[468]. Gianchandani (2011) defined key stakeholders and the impact of their roles in decision-making related to the transformation of the healthcare system; as well as the effect of stakeholder networks on IS design and integration of multiple diverse roles and opinions. The author highlights key stakeholders: patients as service recipients and healthcare specialists as service providers.

Patients as service recipients often have difficulty understanding confusing information on their disease and symptoms. It is rather frequent that the healthcare is poorly integrated across institutions providing different levels of care as well as across different healthcare specialists. Patients and their families often have poor knowledge about treatment and care, conclusions of physicians or interpretation of test results[469]. Aiming to overcome challenges faced by the modern healthcare system, it is increasingly important to respond to the need of patients to be informed, especially when it comes to availability of necessary health care services,

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[467] Pang M.-S., Lee G. and DeLone W. H. IT resources, organizational capabilities, and value creation in public-sector organizations: a public-value management perspective. Journal of Information Technology. 2014, 29:187–205.

[468] Gianchandani E. P. Toward smarter health and well-being: an implicit role for networking and information technology. Journal of Information Technology. 2011, 26: 120–128.

[469] Gianchandani E. P. Toward smarter health and well-being: an implicit role for networking and information technology. Journal of Information Technology. 2011, 26: 120–128.

treatment and care plans, and conclusions of a physician or test results[470]. The variety of modern tools of communication, a wide choice of instruments for monitoring of health indicators, transfer of services to the electronic space may provide a patient with an opportunity to follow his/her health indicators and at the same time ensure feedback as consultations with a healthcare specialist and assessment of indicators can be done at a distance, without a visit to healthcare institutions. Aiming to ensure the longest stay of a patient at home, it is important to ensure accessibility of services, i.e. to bring required care closer to the home of a patient. For this purpose, advanced technologies can be used in the form of designed and installed IS that ensure continuity of patient care, monitoring of healthcare indicators, continuous patient training and motivation to care for own health. Well planned IT and IS solutions may ensure continuous accessible monitoring of health status, consultation and warning services, as well as the provision of required psychological support in daily activities. At the same time, these IS solutions must be extended considering the social and organisational environment, which means that healthcare-related IS should be designed in the way that would promote wide uptake of IS and satisfy requirements of sociotechnical systems (clear result and effect)[471].

Healthcare specialists are healthcare, providers. In the healthcare sector, an increasingly greater impact is made by modern IS and communication technologies that help to develop high-quality healthcare services[472]. However, daily work of health care specialists is still faced with problems related to dissemination and retrieval of information, which is especially relevant for decision-making in real time and provision of health care

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[470] Martin, A., Lassman, D., Whittle, L. and Catlin, A. and the National Health Expenditure Accounts Team (2011). Recession Contributes to Slowest Annual Rate of Increase in Health Spending in Five Decades, Health Affairs 30(1): 11–22.

[471] President's Council of Advisors on Science and Technology. Report to the President and Congress: Designing a digital future: Federally funded research and development in networking and information technology. The White House Executive Office of the President. 2010. [interactive]. [accessed 10-11-2014]. <http://www.whitehouse.gov/ sites/default/files/microsites/ostp/pcast-nitrd-report-2010.pdf>.

[472] Štaras K. Impact of information technologies for increasing efficiency of the health care institution: analysis, evaluation and effectiveness. Doctoral Dissertation. 2011, p. 16–60.

services for patients with chronic conditions[473].It is important to use new tools inside the healthcare system in order to satisfy needs of healthcare specialist at the right time and place as well as ensure retrieval and provision of relevant information. Engagement and direct participation of healthcare specialists are necessary for the design of new advanced IT and IS[474]. According to researchers, failure to appropriately design IT and IS and realise required processes may damage service quality and result in growing fear to use such instruments[475]. Landon et al. (2003) believed that inappropriately answered needs of healthcare professionals may result in failure to input full data or refusal to use IS. In the opinion of healthcare professionals, however, IS that are appropriately realised and transferred to electronic space can significantly facilitate organisation and provision of healthcare services[476].

This case study aims to assess IS needs in an outpatient healthcare institution and analyse how IS services were realised. To achieve this, the public institution *Central Polyclinic* was selected for assessment and description of experience gained during the installation of the electronic service for nursing at home and palliative care (Nursing IS). In addition, evaluations were carried out on satisfaction of stakeholder needs through the realisation of certain processes in Nursing IS.

3.6.1. Analysis of causes that necessitated the Nursing IS in the Central Polyclinic

The *Central Polyclinic* seems to be the only public institution in the city of Vilnius that provides integrate nursing, palliative medicine, and social

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[473] Gianchandani E. P. Toward smarter health and well-being: an implicit role for networking and information technology. Journal of Information Technology. 2011, 26: 120–128.

[474] Protti, D. and Johansen, I. Widespread Adoption of Information Technology in Primary Care Physician Offices in Denmark: A case study. The Commonwealth Fund. 2010. [interactive]. [accessed 07-11-2014] <http://www.commonwealthfund.org/Content/Publications/Issue-Briefs/2010/Mar/Widespread-Adoption-of-Information-Technology-in-Primary-Care-Physician-Offices.aspx#citation>.

[475] Landon B. E., Normand S. T., Blumenthal D. and Daley J. Physician Clinical Performance Assessment. Journal of the American Medical Association. 2003, 290 (9): 1183–1189.

[476] Štaras K., Kairys J., Gasperas V., Kudukytė-Gasperė R. The opinion of health care specialists on the impact of information technologies in providing health care services. Social work. 2012; 11(2): 271-288.

services for patients at home. The *Central Polyclinic* started providing services for patients at home 12 years ago when *Naujamiestis Polyclinic* (which is currently the affiliation of the *Central Polyclinic*) established a specialised nursing centre with qualified community nurses to provide more effective health care services and ensure continuity, accessibility and quality of services for patients at home who could not arrive at the healthcare institution due to a disability or health status.

According to *Requirements for nursing services provided at outpatient personal healthcare institutions and or patient's home*, which were signed off by the Order No. V-1026 of the Minister of Health of the Republic of Lithuania on 14 December 2007,[477] nursing services at home are personal healthcare services that aim to ensure accessibility and continuity of nursing services as well as satisfy nursing needs of a patient at home conditions and promote self-care of a patient. The goal of nursing services at home is to improve the quality of life of a patient, retain his/her independence in the living environment, and promote their self-care. Recipients of nursing at home services are people with the special need for continuous nursing care identified following the procedure established by legislative acts. These are the reasons behind nursing at home services organised and provided by the outpatient centre for patients with the special need for nursing (SP1), special need for continuous care (assistance) (SP2) and other patients that cannot independently arrive at the outpatient centre for required health care services due to their health status.

Since 2009, the *Central Polyclinic* started providing outpatient palliative care services for patients at home. Requirements for palliative care services provided to adults and children were approved by the Minister of Health of the Republic of Lithuania by the Order No. V-14 of 11 January 2007[478], which defines palliative care as measures that improve the quality of life of a patient suffering from a life-threatening, incurable and

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[477] Requirements for nursing services provided at outpatient personal healthcare institutions and or patient's home, which were signed off by the Order No. V-1026 of the Minister of Health of the Republic of Lithuania on 14 December 2007. [interactive]. [accessed 07-11-2014]. <http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=311861 &p_tr2=2>.

[478] Requirements for palliative care services provided to adults and children were approved by the Minister of Health of the Republic of Lithuania by the Order No. V-14 of 11 January 2007. [interactive]. [accessed 07-11-2014] <http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=291106&p_tr2=2>.

progressing disease as well as his/her significant others; that prevent or alleviate suffering; and that help to solve other physical, psychosocial and spiritual problems. Understanding that palliative care patients require a holistic approach that encompasses the control of disease symptoms and satisfaction of psychological, spiritual and social needs[479] as well as aiming to develop the infrastructure for palliative care services, the *Central Polyclinic* established the Nursing Centre that brought together a palliative care team comprised of palliative care physician, palliative care nurses and a social worker. Considering the composition of the team, the Nursing Centre was renamed into the Clinic for Nursing, Palliative Medicine and Social Services (the Clinic). In 2010, the team received a new member – a nursing assistant. The aim of the Clinic is to improve the quality of life of patients and their significant others; retain independence of patients within their living environment; promote their self-care; ensure the provision of high-quality palliative care, nursing and other social services at a patient's home. Implementing this aim, specialists of the Clinic provide timely and high-quality services for patients at home if they are unable to arrive at the healthcare institution due to health problems; organise and provide timely and high-quality palliative care services for patients at home diagnosed with a life-threatening, incurable and progressing disease, which has been confirmed following the procedure established by legislative acts; provide services of a social worker for patients in need of palliative care and other patients cared for by nursing specialists of the Clinic.

Nursing at home services: injections, connection and maintenance of the drip system (infusion), drip infusion via catheter and catheter care, diagnostic procedures, bedsore care, care for artificial body openings, drain maintenance, bladder catheterisation and care, placing of rectal suppositories, colon cleansing by enema, enteral nutrition, introduction of probes, administration of medication, therapeutic bath, administration of ice pack, hot pack, lotions, compresses, ointments, wound care, prevention of bedsores, stimulation of urinary reflex, use of bedpans, measurement of blood pressure, pulse and body temperature, assessment of sanitary conditions, and personal hygiene services. Palliative

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[479] Jurkuvienė R., Mickevičiūtė A. Palliative care need for terminally ill patients in Kaunas city. Health sciences. 2007; 5:1184-91.

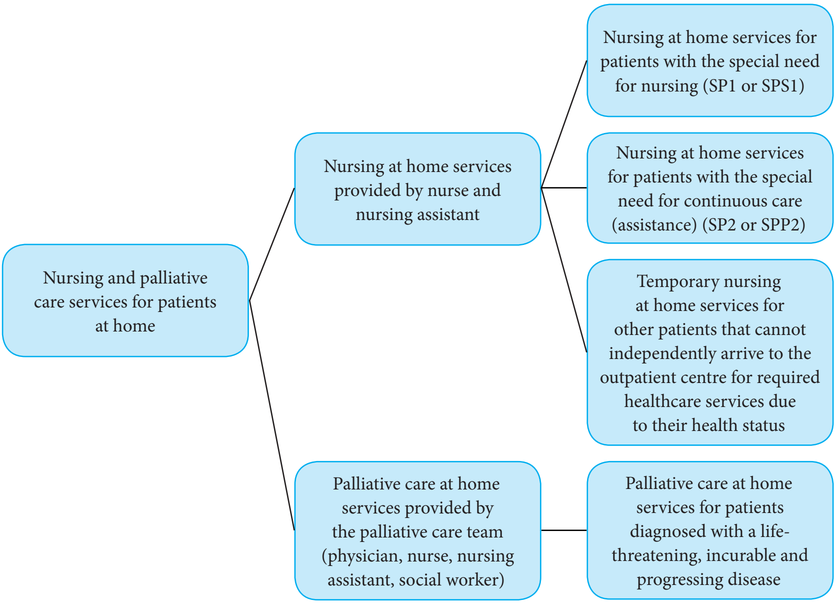

Figure 3.7. Nursing at home and palliative care services provided by the Central Policlinic

care physician provides the following palliative care services: provides outpatient palliative care services for adults and children; coordinates the work of the palliative care team (community of general practice nurses, social workers, nursing assistants and other healthcare professionals that provide services within their competence); provides consultations to patients and their significant others at a personal healthcare institution or at patient's home; assesses the state of health of a patient and prescribes required tests and monitoring; considering the state of health of a patient, recommends medical treatment; coordinates the assessment of care needs and provision of required services; coordinates the assessment and monitoring of social needs, planning and provision of social assistance, and mediation in solving social problems; educates patients and their significant others.

Researchers recognise that chronic diseases pose new challenges for health care systems. Primary, they should be addressed by primary healthcare professionals and multidisciplinary teams of professionals consisting of physicians, nurses, and other specialists[480]. It is more frequent that personal health services are organised and provided to patients at their home. They help to meet needs of patient nursing care, promote self-care, improve the quality of life of patients and their significant others, prevent or alleviate their suffering as well as help deal with other physical, psycho-social and spiritual problems[481]'[482]. Effective nursing services increase the diagnostic accuracy of patients at home and reduces the cost of treatment. In terms of physicians and nurses of healthcare institutions, this helps to reduce the time spent on paperwork and documented planning, cut the costs associated with exchange of information between specialists, and shortens the time required for significant others of a patient for organisation of required care at home. Therefore, the growing number of elderly people will increase the future demand for nursing and social services organised and provided to patients at their home. In response to current problems related to organisation and provision of services for patients at home and considering scientifically-based future challenges, the administration of the *Central Polyclinic* decided to install a specialised information system (Nursing IS) for electronic records of specialists that provide services to patients at home.

Aiming to improve the quality and availability of nursing and palliative care services, it was necessary to computerize the process of service provision; install specialised equipment as well as hardware and software; set up mobile nursing workstations; create electronic medical records of medical activities; ensure the centralised storage of electronic medical records and provide access for authorised users (physicians, nurses, social workers) in real-time; create an electronic interactive service providing a possibility to login and order nursing services on the Internet; install a functionality for health professionals to perform appointed procedures and draw up a plan of patient visits; integrate data exchange with information systems of the

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[480] McKee M., Nolte E. Chronic care. In: Smith P.C., Mossialos E., Papnocolas I., Leatherman S., editors. Performance Measurement for Health System Improvement. Experiences, Challenges and Prospects. European Observatory on Health Systems and Policies, 2011:406-25.

[481] O'Connor SJ. Healthcare delivery. J.Healthc.Manag. 2011;56 (6):355-56.

[482] Erler A, Bodenheimer T, Baker R et al. Preparing primary care for the future - perspectives from the Netherlands, England, and USA. Z.Evid.Fortbild.Qual.Gesundhwes. 2011;105 (8):571-80.

institution; integrate with the Electronic Health Services and Cooperation Infrastructure Information System.

The project for implementation of Nursing IS was funded by the European Union funds[483] and funds of the *Central Polyclinic*. The aim of the project – to ensure accessible, high-quality and timely health care services for patients at home by creating mobile workstations for nurses and the electronic system for management of these services. The objective of the project – to computerise the provision of primary outpatient personal healthcare services, palliative care and long-term care provided to patients at home. Target groups: patients, nursing specialists (providing services for patients at home and working in teams with family doctors), physicians (palliative care, general practice, therapists, paediatricians and physicians-specialists), social workers of the Polyclinic and other professionals (nursing assistants).

The Nursing IS project was designed to address key problems: time and human resources required to organise and deliver services for patients at home (planning on paper), flaws in infrastructure preventing effective provision of services (e.g. complex communication between patients at home, professionals providing services to patients at home (nurses, nursing assistants, social workers, palliative care physicians) and family doctors and nurses as well as administrative staff working at institutions). Subsequent to the provision of nursing, care and palliative care services to patients at home, specialists had to fill manually in the various documents. This method of the document filling and data transfer to other professionals required a lot of time; in addition, there was a chance of human error, especially when filling repetitive patient-related information into different forms. **Table 3.5** provides periodicity and time required for different paper forms that had to be filled by nurses of the *Central Polyclinic* providing services to patients at home prior to the installation of the Nursing IS. Prior to visiting a patient, nurses had to learn about doctor's orders, i.e. access the paper form; and after the visits, they had to provide information, which required nurses to

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[483] The project "Electronic service for nursing at home and palliative care" implemented by Central Polyclinic with partners Central Polyclinic of Vilnius Region and Nemenčinė Polyclinic of Vilnius Region, funded by the European Union funds under the Economic Development Programme Priority 3: "Information Society for All", the instrument's for implementing No. VP2-3.1-ISDC-11-V "Electronic health services in the municipalities".

arrive at the Polyclinic, spending extra time, which could have been used for visiting patients at home and provision of required services. This made it difficult to analyse and control the scale of services provided to patients at home (especially, to evaluate the time required to provide a service) as well as their effectiveness, workloads of specialists and other performance indicators. These problems necessitated the use of additional tools for registering patients for the provision of nursing services at home, services provided to them and their health indicators. In most cases, this was done by hand, filing-out logs or reports, which was especially time-consuming. Such time-consuming and labour-intensive organisational measures had a detrimental effect on the productivity of the healthcare team, which resulted in decreasing number of patients they were able to serve and growing waiting queues. The use of paper forms and logs contributed to growing operating costs of the healthcare institution as well as created document storage concerns. **Figure 3.8** presents the organisational chart for services provided to patients at home prior to the launch of the Nursing IS. The project raised a hypothesis that the time spent by professionals providing services to patients at home for filling of paper forms indicated in Table 1 and trips to the Polyclinic could actually be used for organisation and provision of additional high-quality services provided to patients at home.

Table 3.5. Paper forms that had to be filled by nurses of the *Central Polyclinic* prior to installation of the Nursing IS and filling time required

No.	Number and title of the form	Periodicity of filling	Average filling time in minutes
1.	Patient consent for an invasive procedure and/or intervention and/or surgery; Form 31-1-1/a-CP (approved by the Decree No. V-74 of the Director of the *Central Polyclinic*)	Every time prior to a procedure if the patient is not under continuous care (e.g. SP2). If the patient is under continuous care – once per month (SP1 and palliative patients).	3 min

No.	Number and title of the form	Periodicity of filling	Average filling time in minutes
2.	Sheet 1 for nursing of the patient at home. Document part (Annex 3 to the *Description of requirements for nursing services provided at outpatient personal healthcare institutions and patient's home*)	During the first visit by a nurse to the patient.	5 min
3.	Assessment of the patient needs for nursing at home (Annex 1 to the *Description of requirements for nursing services provided at outpatient personal healthcare institutions and patient's home*)	During the first visit by a nurse to a patient and in case the health state of the patient changes – at least once per month.	10 min
4.	Nursing sheet 2. (Annex 1 to the *Description of requirements for nursing services provided at outpatient personal healthcare institutions and patient's home*)	During each visit.	10 min
5.	Sheet for monitoring health state of patients provided with palliative care services (Annex 2 to the *Description of Requirements for provision of palliative care services to adults and children*)	During the first visit by a nurse to a patient.	5 min
6.	Nursing sheet (Annex 2 to the *Description of Requirements for provision of palliative care services to adults and children*)	During each visit.	10 min
7.	Log of procedures (Form No. 029/a)	Once per months, at the end of each month.	20 min
8.	Working time log for nursing specialists (Form No. 02/a CP, approved by the Decree No. V-1 of the Director on 14 January 2003)	Once per months, at the end of each month.	20 min
9.	The patient health record is filled in with information about the services provided (form No. 025/a) and the inscription is confirmed by a signature and stamp of the nurse	Every time after a service is provided to a patient.	10 min

No.	Number and title of the form	Periodicity of filling	Average filling time in minutes
10.	Codes of services provided have to be filled into the database Med.I.S. (Form No. 025/a –LK)	Every time after a service is provided to a patient.	3 min
11.	Filling of laboratory test forms	Collecting samples.	3 min
12.	Working time log	During each visit.	2 min
13.	Form for assessment and monitoring of wounds	In case of wounds, filled in each time a patient is visited.	8 min
14.	The plan for long-term care. Survey of the patient under nursing care (*Annex 1 to the Description of the procedure for joint provision of nursing and social services*)	During the first visit by a nurse to a patient.	5 min
15.	The plan of daily activities (*Annex 1 to the Description of the procedure for joint provision of nursing and social services*)	During the first visit by a nurse to a patient and in case the health state of the patient changes – at least once per month.	10 min

Source: Public Institution *Central Polyclinic*.

3.6.2. Electronic interactive service for ordering nursing services

Prior installation of the Nursing IS, to order assessment of nursing needs a patient or caregiver had to contact their treating physician by phone, register for the physician's consultation at the Polyclinic or agree upon and book a visit to the patient's home. Patients in need of nursing at home for health reasons (e.g. people with reduced mobility) usually do not have a possibility to arrive at the Polyclinic independently. Limited opportunities to be visited by the treating physician at home and lengthy paper-based arrangement of required nursing services provided at a patient's home usually resulted in the deferred provision of nursing services.

Paper-based method for ordering nursing services provided to patients at home increased the workload of the doctor and the nurse working together in the team (to order the service at home, at least 3 different paper forms had to be filled in), which in turn reduced their work efficiency.

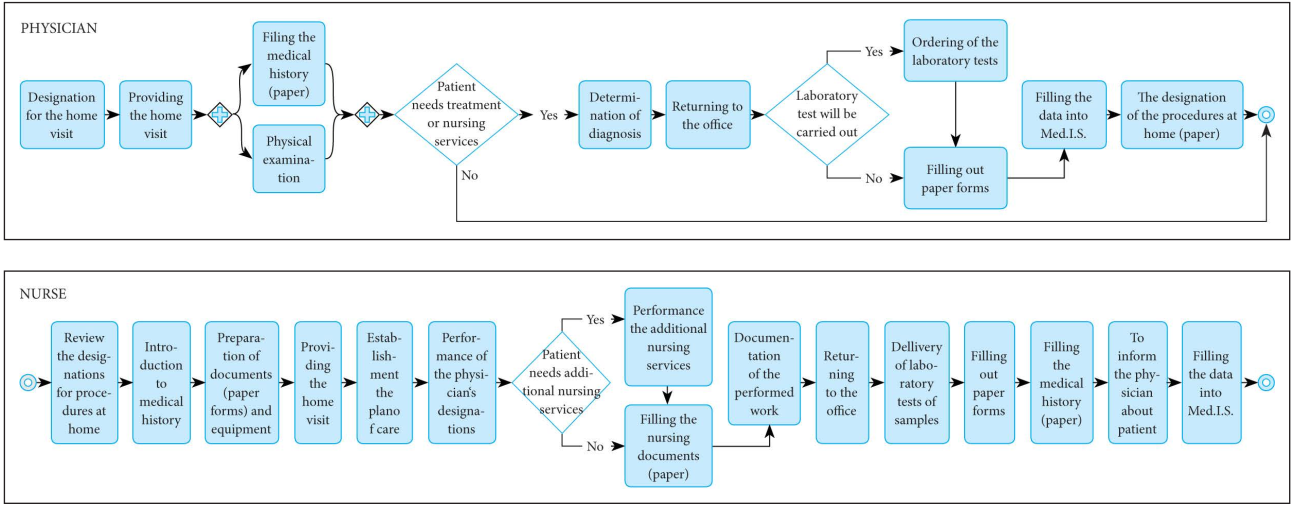


Figure 3.8. Organisational chart of services provided to patients at home prior to the launch of the Nursing IS

Source: Public Institution Central Polyclinic

This paper-based ordering of services posed a number of communication problems, such as human errors in filling with forms. In addition, a lot of time was required from a physician working in a team with a nurses to arrange visits to a patient's home. Team meetings with personal healthcare specialists (family doctors nurses working in their teams, nurses providing services to patients at home), representatives of the administration, IT specialists of the *Central Polyclinic* and IS installers led to a joint decision to use a reliable and secure personal identification and authentication method via the Information System for Interoperability between Public Administration Information Systems (VAIISIS), currently known as the State Information Resources Interoperability Platform (VIISP). With the help of the authentication and identification service, following the launch of the Nursing IS, patients were provided with a possibility to order nursing services remotely. Aiming to ensure an appropriate accountability for services provided and exclusive availability of services to the target group of patients of the Polyclinic who are in need of nursing services provided at home, the Nursing IS function for ordering of survives was only made accessible to patients enrolled in the Polyclinic. **Figure 3.9** provides a diagram that details the process of ordering nursing services to a patient's home with the help of VAIISIS (VIISP). **Figure 3.10** provides visualisation of the Patient Portal of the *Central Polyclinic*.

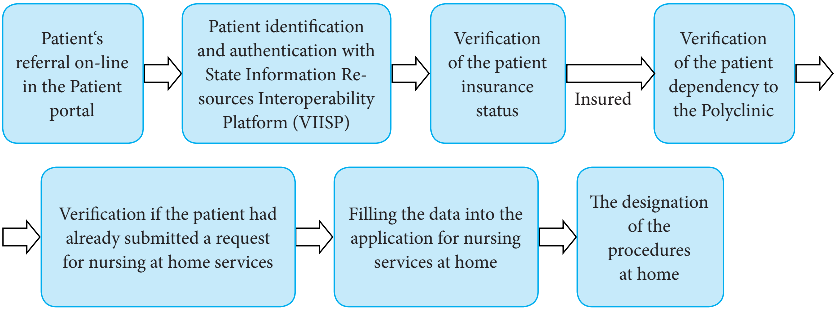
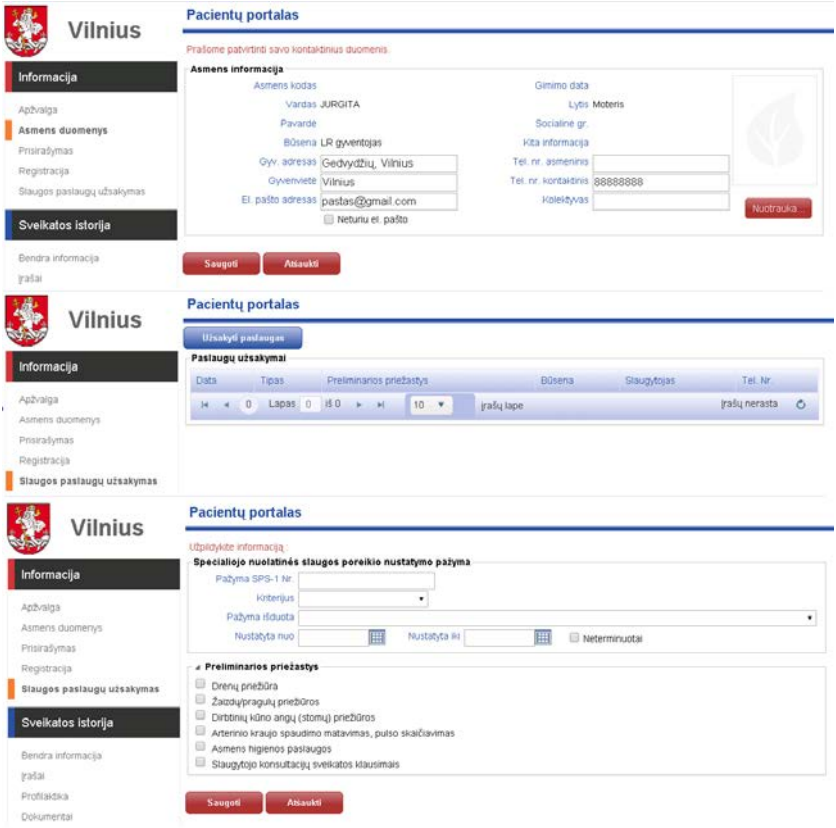


Figure 3.9. Simplified diagram of the process for ordering a nursing service to a patient's home with the help of the authentication and identification service provided by VAIISIS (VIISP)

Source: Public Institution Central Polyclinic



Prašome patvirtinti savo kontaktinius duomenis

Asmens informacija

Asmens kodas
Vardas JURGITA
Pavardė
Būsena LR gyventojas
Gyv. adresas Gedvydžių, Vilnius
Gyvenvietė Vilnius
El. pašto adresas pastas@gmail.com
☐ Neturiu el. pašto
Gimimo data
Lytis Moteris
Socialinė gr.
Kita informacija
Tel. nr. asmeninis
Tel. nr. kontaktinis 88888888
Kolektyvas

Paslaugų užsakymai

Data	Tipas	Preliminarios priežastys	Būsena	Slaugytojas	Tel. Nr

0 Lapas 0 iš 0 10 įrašų lape įrašų nerasta

Užpildykite informaciją :

Specialiojo nuolatinės slaugos poreikio nustatymo pažyma

Pažyma SPS-1 Nr.
Kriterijus
Pažyma išduota
Nustatyta nuo
Nustatyta iki
☐ Neterminuotai

Preliminarios priežastys

☐ Drenų priežiūra
☐ Žaizdų/pragulų priežiūros
☐ Dirbtinių kūno angų (stomų) priežiūros
☐ Arterinio kraujo spaudimo matavimas, pulso skaičiavimas
☐ Asmens higienos paslaugos
☐ Slaugytojo konsultacijų sveikatos klausimais

Figure 3.10. Visualisation of the Patient Portal of the Central Polyclinic and order placing for a nursing service to a patient's home

Source: Public Institution Central Polyclinic

3.6.3. Appointment to provide a nursing service

The diagram presented in **Figure 3.11** illustrates how the Nursing IS creates appointments to provide nursing services. The appointments are created for patients enrolled in the list of people entitled to nursing services provided at home (if a patient is not on the list but requires nursing services, the personal health care specialist that prescribes a service must create an appointment and the administrator has to allocate a specialists to

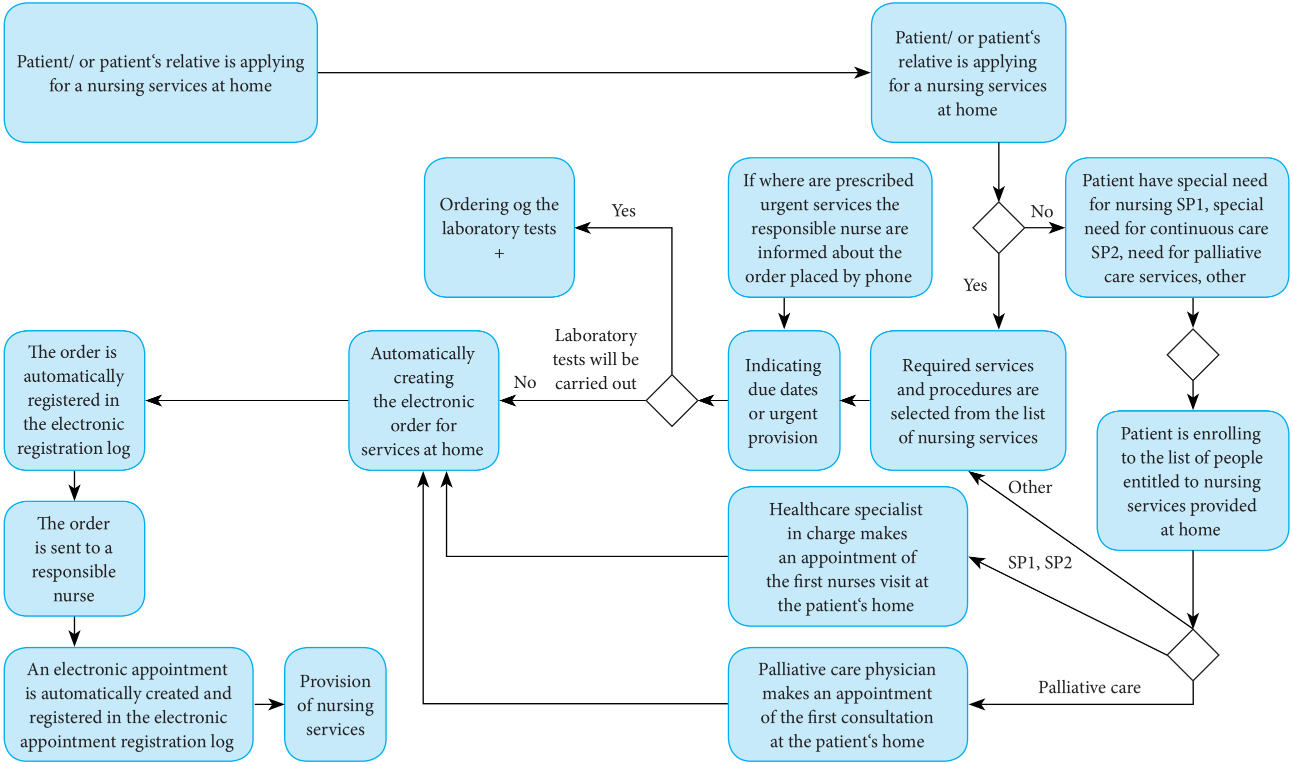
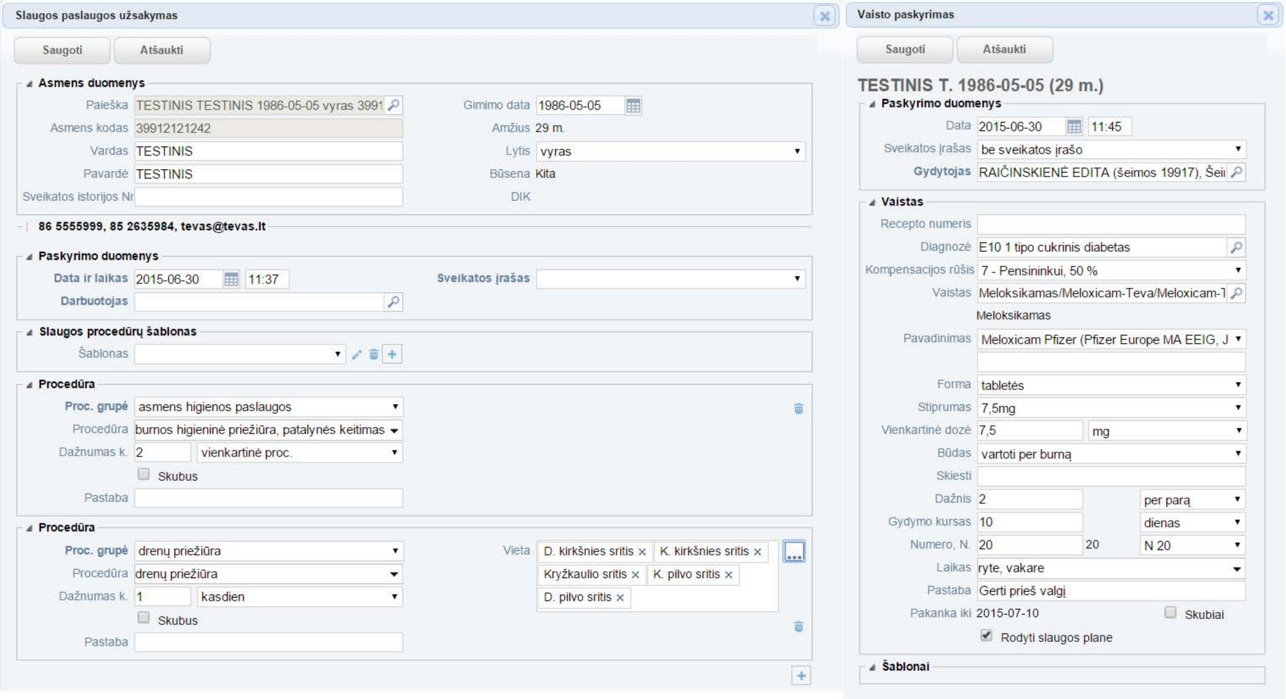


Figure 3.11. Creation of appointments to provide nursing services in the Nursing IS

Source: Public Institution *Central Polyclinic* provide services at home). For patients enrolled in the list of people entitled to nursing services provided at home, required services and procedures are selected from the list of nursing services provided to patients at home indicating due dates or urgent provision. Appointments are created based on competencies of a health care professional as indicated in medical standards signed-off by the Minister of Health of the Republic of Lithuania, e.g. medical treatment and laboratory tests can only be prescribed by a physician. **Figure 3.12** provides visualisation of appointments to provide nursing services and medical treatment in the Nursing IS.

If particular care or nursing needs are identified for a patient for the first time (SP1, SP2), a healthcare specialist in charge should appoint a nurse for the first visit to assess the need for nursing services provided at the patient's home. If a patient requires palliative care, the treating physician fills in an electronic referral for the palliative care team to assess the need for palliative care provided at the patient's home. According to the need and based on referral data, the Nursing IS can create and print documents (e.g. Form 027/a – An Extract from Medical Documents). Once palliative care physician receives the referral, he/she makes an appointment for the first consultation at the patient's home to assess the scale and frequency of required palliative care. As soon as specific services (including a collection of laboratory samples) or the first visit are prescribed, an electronic order for services at home is automatically created. The order is automatically registered in the electronic registration log. Orders are sent to an employee responsible for the management of services provided to patients at home, who designates a responsible nurse and a nursing assistant and in case of palliative care – a nurse, a social worker and a nursing assistant; and indicates the due date for services or procedures. Once the order is filled with data of a nurse (social worker) designated to provide services and the due dates are indicated, an electronic appointment is automatically created and registered in the electronic appointment registration log. As soon as the designated responsible nurse (nursing assistant, social worker) accepts the appointment, the process "Provision of nursing services" commences. If a physician prescribes urgent nursing services at home, the employee-administrator responsible for the management of services provided to patients at home and the responsible nurse are informed about the order placed by phone.



Asmens duomenys

Paieška	TESTINIS TESTINIS 1986-05-05 vyras 3991	Gimimo data	1986-05-05
Asmens kodas	39912121242	Amžius	29 m.
Vardas	TESTINIS	Lytis	vyras
Pavardė	TESTINIS	Būsena	Kita
Sveikatos istorijos Nr		DIK	

86 5555999, 85 2635984, tevas@tevas.lt

Paskyrimo duomenys

Data ir laikas	2015-06-30 11:37	Sveikatos įrašas	
Darbuotojas			

Slaugos procedūrų šablonas

Šablonas	

Procedūra

Proc. grupė	asmens higienos paslaugos
Procedūra	burnos higieninė priežiūra, patalynės keitimas
Dažnumas k.	2 vienkartinė proc.
	☐ Skubus
Pastaba	

Procedūra

Proc. grupė	drenų priežiūra	Vieta	D. kirkšnies sritis × K. kirkšnies sritis × Kryžkaulio sritis × K. pilvo sritis × D. pilvo sritis ×
Procedūra	drenų priežiūra		
Dažnumas k.	1 kasdien		
	☐ Skubus		
Pastaba			

TESTINIS T. 1986-05-05 (29 m.)

Paskyrimo duomenys

Data	2015-06-30 11:45
Sveikatos įrašas	be sveikatos įrašo
Gydytojas	RAIČINSKIENĖ EDITA (šeimos 19917), Šei

Vaistas

Recepto numeris		
Diagnozė	E10 1 tipo cukrinis diabetas	
Kompensacijos rūšis	7 - Pensininkui, 50 %	
Vaistas	Meloksikamas/Meloxicam-Teva/Meloxicam-1 Meloksikamas	
Pavadinimas	Meloxicam Pfizer (Pfizer Europe MA EEIG, J	
Forma	tabletės	
Stiprumas	7,5mg	
Vienkartinė dozė	7,5	mg
Būdas	vartoti per burną	
Skiesti		
Dažnis	2	per parą
Gydymo kursas	10	dienas
Numero, N.	20 20	N 20
Laikas	ryte, vakare	
Pastaba	Gerti prieš valgį	
Pakanka iki	2015-07-10	☐ Skubiai
	☑ Rodyti slaugos plane	

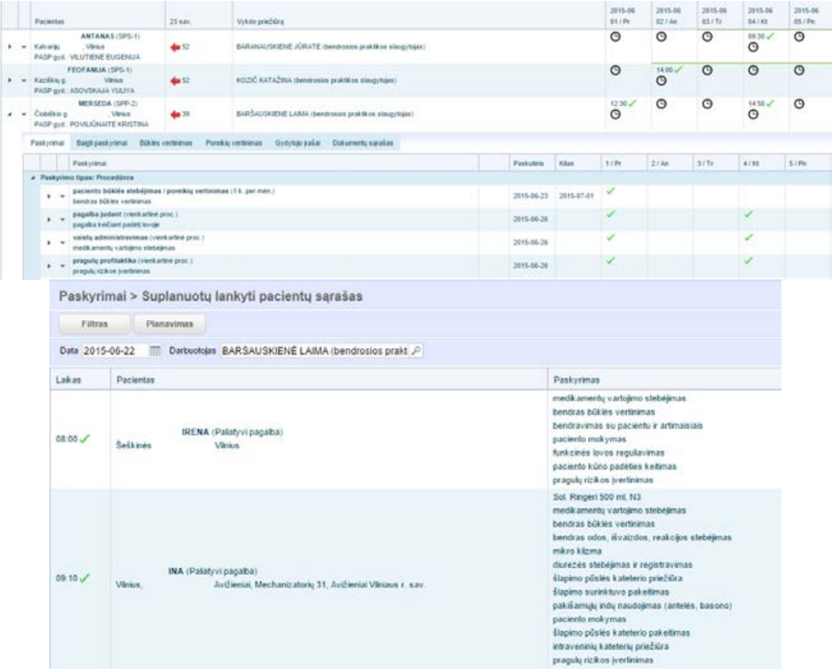
Šablonai

Figure 3.12. Visualisation of screens used for appointment of nursing services and prescription of pharmaceuticals

Source: Public Institution Central Polyclinic

3.6.4. Provision of services at home

Nursing IS ensures that regardless of the designation of tasks (initial visit for assessing the need for services; doctor's appointment; procedures or services provided by a nurse, a nursing assistant or a social worker independently, without a doctor's appointment), provision of services at home begins with the preparation for the visit. A plan of visits is drawn up (**Figure 3.13**) and the visitation time is agreed with the patient or the caregiver. The healthcare professional gets acquainted with the personal health records, inscriptions of the treating physician, results of tests, prescribed medical treatments, etc. If required, the situation is discussed with other health care professionals – members of the team. Transport is an order on demand, nursing and other aids as well as diagnostic equipment are prepared, and documents are printed (e.g. patient consent for an invasive procedure and/or the intervention).



Pacientas	23 sav.	Vykdo priežiūrą	2015-06 01 / Pr	2015-06 02 / An	2015-06 03 / Tr	2015-06 04 / Kt	2015-06 05 / Pn
ANTANAS (SPS-1) Kalvarijų , Vilnius PASP gyd.: VILUTIENĖ EUGENIJA	52	BARANAUSKIENĖ JŪRATĖ (bendrosios praktikos slaugytojas)	◷	◷	◷	09:30 ✓ ◷	◷
FEOFANIJA (SPS-1) Kazliškių g. Vilnius PASP gyd.: ASOVSKAJA YULIYA	52	KOZIČ KATAŽINA (bendrosios praktikos slaugytojas)	◷	14:00 ✓ ◷	◷	◷	◷
MERSEDA (SPP-2) Čiobiškio g. , Vilnius PASP gyd.: POVILIŪNAITĖ KRISTINA	39	BARŠAUSKIENĖ LAIMA (bendrosios praktikos slaugytojas)	12:30 ✓ ◷	◷	◷	14:50 ✓ ◷	◷

Paskyrimai | Baigti paskyrimai | Būklės vertinimas | Poreikių vertinimas | Gydytojo įrašai | Dokumentų sąrašas

Paskyrimai	Paskutinis	Kitas	1 / Pr	2 / An	3 / Tr	4 / Kt	5 / Pn
Paskyrimo tipas: Procedūros							
paciento būklės stebėjimas / poreikių vertinimas (1 k. per mėn.) bendras būklės vertinimas	2015-06-23	2015-07-01	✓				
pagalba judant (vienkartinė proc.) pagalba keičiant padėtį lovoje	2015-06-26		✓			✓	
vaistų administravimas (vienkartinė proc.) medikamentų vartojimo stebėjimas	2015-06-26		✓			✓	
pragulų profilaktika (vienkartinė proc.) pragulų rizikos įvertinimas	2015-06-26		✓			✓	

Paskyrimai > Suplanuotų lankyti pacientų sąrašas

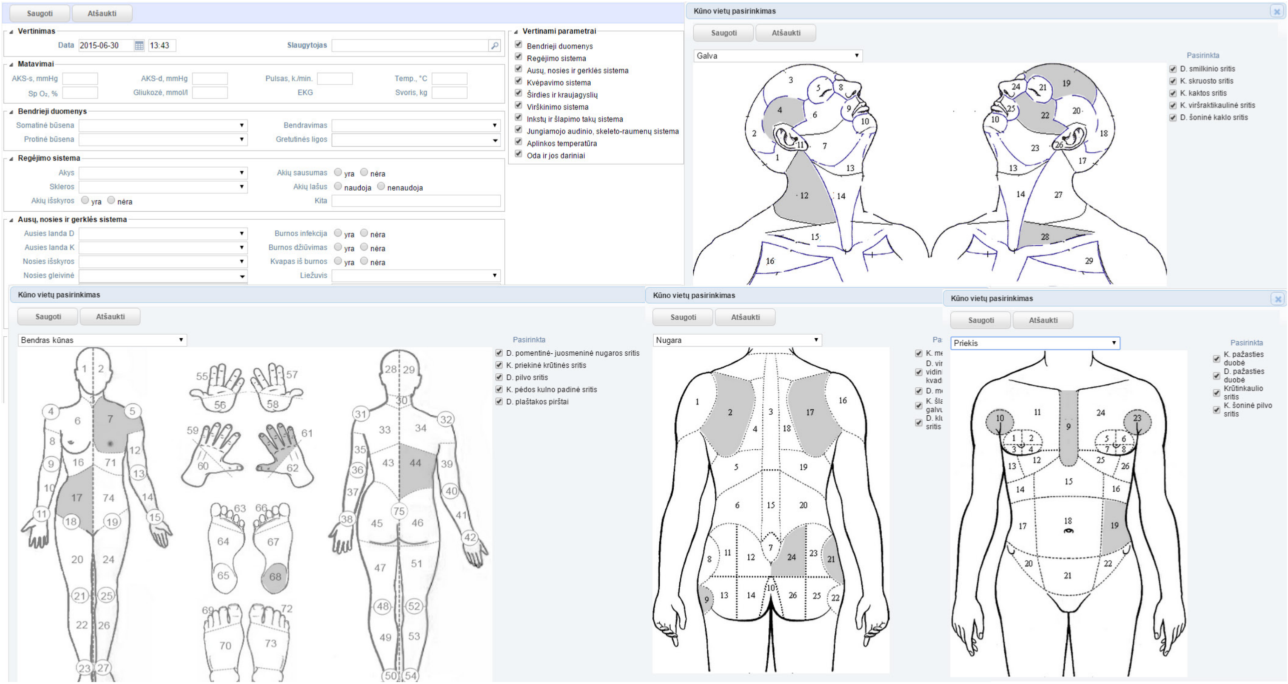
Filtras | Planavimas

Data 2015-06-22 Darbuotojas BARŠAUSKIENĖ LAIMA (bendrosios prakt

Laikas	Pacientas	Paskyrimas
08:00 ✓	Šeškinės **IRENA** (Paliatyvi pagalba) Vilnius	medikamentų vartojimo stebėjimas bendras būklės vertinimas bendravimas su pacientu ir artimaisiais paciento mokymas funkcinės lovos reguliavimas paciento kūno padėties keitimas pragulų rizikos įvertinimas
09:10 ✓	Vilnius, **INA** (Paliatyvi pagalba) Avižieniai, Mechanizatorių 31, Avižieniai Vilniaus r. sav.	Sol. Ringeri 500 ml. N3 medikamentų vartojimo stebėjimas bendras būklės vertinimas bendras odos, išvaizdos, reakcijos stebėjimas mikro klizma diurezės stebėjimas ir registravimas šlapimo pūslės kateterio priežiūra šlapimo surinktuvo pakeitimas pakišamųjų indų naudojimas (antelės, basono) paciento mokymas šlapimo pūslės kateterio pakeitimas intraveninių kateterių priežiūra pragulų rizikos įvertinimas

Figure 3.13. Screens for planning nursing services at home

Source: Public Institution Central Polyclinic



Vertinimas

Data 2015-06-30 13:43 Slaugytojas

Matavimai

AKS-s, mmHg AKS-d, mmHg Pulsas, k./min. Temp., °C

Sp O_2, % Gliukozė, mmol/l EKG Svoris, kg

Bendrieji duomenys

Somatinė būsena Bendravimas

Protinė būsena Gretutinės ligos

Regėjimo sistema

Akys Akių sausumas ○ yra ○ nėra

Skleros Akių lašus ○ naudoja ○ nenaudoja

Akių išskyros ○ yra ○ nėra Kita

Ausų, nosies ir gerklės sistema

Ausies landa D Burnos infekcija ○ yra ○ nėra

Ausies landa K Burnos džiūvimas ○ yra ○ nėra

Nosies išskyros Kvapas iš burnos ○ yra ○ nėra

Nosies gleivinė Liežuvis

Vertinami parametrai

- ☑ Bendrieji duomenys
- ☑ Regėjimo sistema
- ☑ Ausų, nosies ir gerklės sistema
- ☑ Kvėpavimo sistema
- ☑ Širdies ir kraujagyslių
- ☑ Virškinimo sistema
- ☑ Inkstų ir šlapimo takų sistema
- ☑ Jungiamojo audinio, skeleto-raumenų sistema
- ☑ Aplinkos temperatūra
- ☑ Oda ir jos dariniai

Pasirinkta

- ☑ D. smilkinio sritis
- ☑ K. skruosto sritis
- ☑ K. kaktos sritis
- ☑ K. viršraktikaulinė sritis
- ☑ D. šoninė kaklo sritis

Pasirinkta

- ☑ D. pomentinė- juosmeninė nugaros sritis
- ☑ K. priekinė krūtinės sritis
- ☑ D. pilvo sritis
- ☑ K. pėdos kulno padinė sritis
- ☑ D. plaštakos pirštai

Pa

- ☑ K. me
- D. vir
- ☑ vidin kvad
- ☑ D. m
- ☑ K. šla galvu
- ☑ D. klu sritis

Pasirinkta

- ☑ K. pažasties duobė
- ☑ D. pažasties duobė
- ☑ Krūtinkaulio sritis
- ☑ K. šoninė pilvo sritis

Figure 3.14. Assessment of a patient's health status conducted by a nurse with the help of Nursing IS

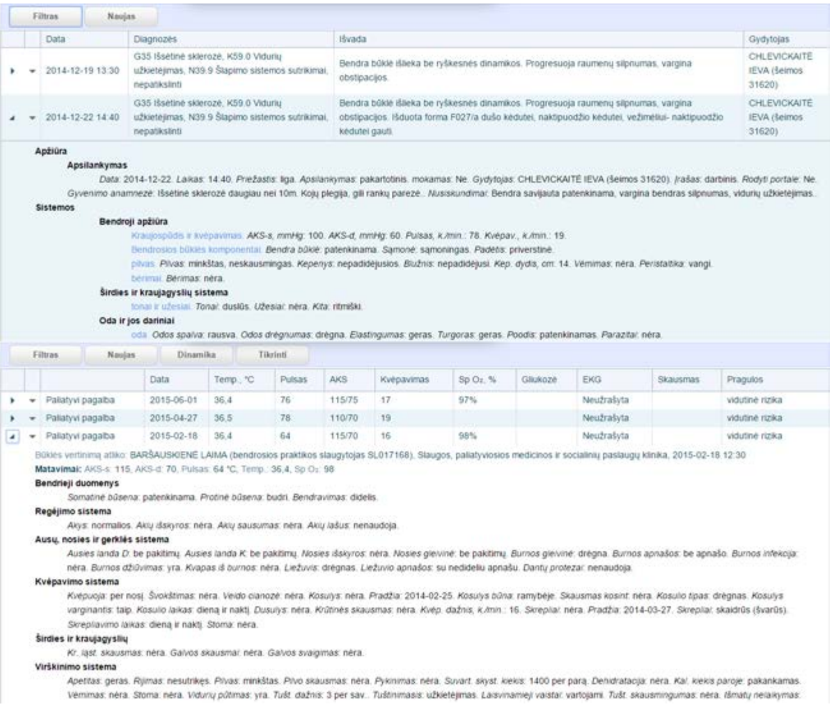
Source: Public Institution *Central Polyclinic*

During a visit to the patient's home, a nurse performs the assessment of needs for individual nursing services and, within the remit of competencies – the evaluation of the patient's health status (**Figure 3.14**) as well as identifies nursing issues, formulates nursing goals and designs the plan of nursing measures (including services of a nursing assistant) and sets implementation timescales (**Figure 3.13**). On the basis of this data, the system generates a personal electronic healthcare (nursing) record and an electronic record of nursing appointments.

During the visit for assessment of the scope of palliative care, a visiting professional – a member of the palliative care team (a palliative care physician, a nurse, a social worker) – also assesses the needs of the patient and his/her significant others. The nurse undertakes the above-described procedures for the assessment of needs for individual nursing services and the assessment of the patient's health status (**Figure 3.14**), and a social worker – the assessment of the patient's social needs, which results in the design of the plan and timescales for the provision of social services. On the basis of this data, the system generates an electronic personal healthcare (members of the palliative care) record and an electronic record of nursing and social assistance appointments.

Once services are provided, care results must be assessed. If the patient requires additional services, the assessment of individual needs of the patient (both nursing and social) and the assessment of the health status are undertaken to clarify or redesign the care plan and timescales. The data regarding the services provided and results are inputted into the Nursing IS, this way adding information to an electronic personal healthcare (care at home) record (**Figure 3.15**).

If specialised mobile diagnostic equipment is used to provide services, data on the health status of the patient is registered, stored and revised during the registration of data (**Figure 3.16**) and transferred to the information system of the healthcare institution by adding information as an electronic personal healthcare (nursing) record.



		Data	Diagnozės	Išvada	Gydytojas
▸	▾	2014-12-19 13:30	G35 Išsėtinė sklerozė, K59.0 Vidurių užkietėjimas, N39.9 Šlapimo sistemos sutrikimai, nepatikslinti	Bendra būklė išlieka be ryškesnės dinamikos. Progresuoja raumenų silpnumas, vargina obstipacijos.	CHLEVICKAITĖ IEVA (šeimos 31620)
◂	▾	2014-12-22 14:40	G35 Išsėtinė sklerozė, K59.0 Vidurių užkietėjimas, N39.9 Šlapimo sistemos sutrikimai, nepatikslinti	Bendra būklė išlieka be ryškesnės dinamikos. Progresuoja raumenų silpnumas, vargina obstipacijos. Išduota forma F027/a dušo kėdutei, naktipuodžio kėdutei, vežimėliui- naktipuodžio kėdutei gauti.	CHLEVICKAITĖ IEVA (šeimos 31620)

Apžiūra

Apsilankymas

Data: 2014-12-22. *Laikas*: 14:40. *Priežastis*: liga. *Apsilankymas*: pakartotinis. *mokamas*: Ne. *Gydytojas*: CHLEVICKAITĖ IEVA (šeimos 31620). *Įrašas*: darbinis. *Rodyti portale*: Ne.

Gyvenimo anamnezė: Išsėtinė sklerozė daugiau nei 10m. Kojų plegija, gili rankų parezė.. *Nusiskundimai*: Bendra savijauta patenkinama, vargina bendras silpnumas, vidurių užkietėjimas..

Sistemos

Bendroji apžiūra

Kraujospūdis ir kvėpavimas. *AKS-s, mmHg*: 100. *AKS-d, mmHg*: 60. *Pulsas, k./min.*: 78. *Kvėpav., k./min.*: 19.

Bendrosios būklės komponentai. *Bendra būklė*: patenkinama. *Sąmonė*: sąmoningas. *Padėtis*: priverstinė.

pilvas. *Pilvas*: minkštas, neskausmingas. *Kepenys*: nepadidėjusios. *Blužnis*: nepadidėjusi. *Kep. dydis, cm*: 14. *Vėmimas*: nėra. *Peristaltika*: vangi.

bėrimai. *Bėrimas*: nėra.

Širdies ir kraujagyslių sistema

tonai ir ūžesiai. *Tonai*: duslūs. *Ūžesiai*: nėra. *Kita*: ritmiški.

Oda ir jos dariniai

oda. *Odos spalva*: rausva. *Odos drėgnumas*: drėgna. *Elastingumas*: geras. *Turgoras*: geras. *Poodis*: patenkinamas. *Parazitai*: nėra.

			Data	Temp., °C	Pulsas	AKS	Kvėpavimas	Sp O₂, %	Gliukozė	EKG	Skausmas	Pragulos
▸	▾	Paliatyvi pagalba	2015-06-01	36,4	76	115/75	17	97%		Neužrašyta		vidutinė rizika
▸	▾	Paliatyvi pagalba	2015-04-27	36,5	78	110/70	19			Neužrašyta		vidutinė rizika
◂	▾	Paliatyvi pagalba	2015-02-18	36,4	64	115/70	16	98%		Neužrašyta		vidutinė rizika

Būklės vertinimą atliko: BARŠAUSKIENĖ LAIMA (bendrosios praktikos slaugytojas SL017168). Slaugos, paliatyviosios medicinos ir socialinių paslaugų klinika, 2015-02-18 12:30

Matavimai: AKS-s: 115, AKS-d: 70, Pulsas: 64 °C, Temp.: 36,4, Sp O₂: 98

Bendrieji duomenys

Somatinė būsena: patenkinama. *Protinė būsena*: budri. *Bendravimas*: didelis.

Regėjimo sistema

Akys: normalios. *Akių išskyros*: nėra. *Akių sausumas*: nėra. *Akių lašus*: nenaudoja.

Ausų, nosies ir gerklės sistema

Ausies landa D: be pakitimų. *Ausies landa K*: be pakitimų. *Nosies išskyros*: nėra. *Nosies gleivinė*: be pakitimų. *Burnos gleivinė*: drėgna. *Burnos apnašos*: be apnašo. *Burnos infekcija*: nėra. *Burnos džiūvimas*: yra. *Kvapas iš burnos*: nėra. *Liežuvis*: drėgnas. *Liežuvio apnašos*: su nedideliu apnašu. *Dantų protezai*: nenaudoja.

Kvėpavimo sistema

Kvėpuoja: per nosį. *Švokštimas*: nėra. *Veido cianozė*: nėra. *Kosulys*: nėra. *Pradžia*: 2014-02-25. *Kosulys būna*: ramybėje. *Skausmas kosint*: nėra. *Kosulio tipas*: drėgnas. *Kosulys varginantis*: taip. *Kosulio laikas*: dieną ir naktį. *Dusulys*: nėra. *Krūtinės skausmas*: nėra. *Kvėp. dažnis, k./min.*: 16. *Skrepliai*: nėra. *Pradžia*: 2014-03-27. *Skrepliai*: skaidrūs (švarūs). *Skrepliavimo laikas*: dieną ir naktį. *Stoma*: nėra.

Širdies ir kraujagyslių

Kr. ląst. skausmas: nėra. *Galvos skausmai*: nėra. *Galvos svaigimas*: nėra.

Virškinimo sistema

Apetitas: geras. *Rijimas*: nesutrikęs. *Pilvas*: minkštas. *Pilvo skausmas*: nėra. *Pykinimas*: nėra. *Suvart. skyst. kiekis*: 1400 per parą. *Dehidratacija*: nėra. *Kal. kiekis paroje*: pakankamas. *Vėmimas*: nėra. *Stoma*: nėra. *Vidurių pūtimas*: yra. *Tušt. dažnis*: 3 per sav.. *Tuštinimasis*: užkietėjimas. *Laisvinamieji vaistai*: vartojami. *Tušt. skausmingumas*: nėra. *Išmatų nelaikymas*:

Figure 3.15. Visualisation of an electronic personal healthcare (care at home) record

Source: Public Institution *Central Polyclinic*

3.6.5. Mobile nursing workstations

A mobile nursing workstation ensures a possibility for nurses to provide service to patients at home, measure, read and view as well as transfer pulse, EKG, SpO2, blood glucose, temperature and other measurements to the Nursing IS. Integration of the specialised computerised software module installed in mobile nursing workstations with the Nursing IS allows to receive patient data and send measurements. The graphical user interface of the specialised, computerised software module can be used intuitively and helps nurses to take appropriately required measurements: on the screen, the sequence of required actions is demonstrated. Once all measurements are taken, they can be viewed and printed. The touch-

Pasirinkite norimus matavimus ir spauskite tęsti

Kraujo spaudimo matavimas

1. Uždėkite rankovę ant kairės rankos
2. Paspauskite "START/STOP" mygtuką kraujo spaudimo įrenginyje ir laukite rezultatų.

Gaunami rezultatai...

Kraujo spaudimo matavimas

Rezultatas

Systolic: 122 mmHg

Diastolic: 82 mmHg

Pulsas: 94 bpm

EKG

Įrašyti ir perduoti EKG

1. Prašome įrašyti EKG remiantis instrukcijomis nurodytomis vartotojo vadove.
2. Po EKG įrašymo įrenginyje pradeda mirksėti mėlynas LED. Siuntimą atvaizduos ekrane pasirodanti siuntimo progreso juosta.
3. Prašome palaukti kol ekrane bus atvaizduota EKG.

EKG peržiūra

DARBUOTOJAS TESTINIS, 15 m. nežinoma

Atlikta: 2015-01-25 23:07

Figure 3.16. Visualisation of a mobile nursing workstation and graphical representation of remotely taken measurements in the Nursing IS

Source: Public Institution *Central Polyclinic*

screens are comfortable to use and the software is easy to understand, which ensures fast and high-quality measurements. If required, the treating physician can be contacted at once to take urgent decisions regarding further nursing actions. The figure below provides the visualisation of the solution.

3.6.6. Summary of the case study

Installation of new business processes and modification of those available prior to the Nursing results in increased information exchange effectiveness and labour productivity (**Table 3.6**). As a result of introduced business processes based on the use of the information system, physicians spend less time creating electronic orders for provision of nursing services at home than filling in various paper forms with repeated patient information. The system provides a possibility to use partially filled data fields and typical text templates. The information is more accurate due to reduced probability of error. Data regarding prescribed nursing services, indications for palliative care, etc. are inputted with the help of various classifications. Compilation and availability of lists of patients entitled to nursing services provided at home allow to ensure continuity and timely provision of services.

Table 3.6. Assessment of the increase in the information exchange effectiveness following installation of the Nursing IS

No.	What documents will no longer be filled?	Number of inscriptions	Time saved per inscription, in minutes	Total, in minutes
1.	Sheet 1 for nursing of the patient at home. Document part (Annex 3 to the *Description of requirements for nursing services provided at outpatient personal healthcare institutions and patient's home*). During the first visit by a nurse to the patient.	500	6	3.000
2.	Assessment of the patient needs for nursing at home (Annex 1 to the *Description of requirements for nursing services provided at outpatient personal healthcare institutions and patient's home*). During the first visit by a nurse to a patient and in case the health state of the patient changes – at least once per month.	3.000	2	6.000

No.	What documents will no longer be filled?	Number of inscriptions	Time saved per inscription, in minutes	Total, in minutes
3.	Nursing sheet (Annex to the *Description of requirements for nursing services provided at outpatient personal health-care institutions and patient's home*)	4.000	3	12.000
4.	Sheet for monitoring the health state of patients provided with palliative care services (Annex 2 to the *Description of Requirements for the provision of palliative care services to adults and children*). During the first visit by a nurse to a patient.	200	4	800
5.	Nursing sheet (Annex 2 to the *Description of Requirements for the provision of palliative care services to adults and children*). During the first visit.	7.400	3	22.200
6.	Log of procedures (Form 029/a). Once per months, at the end of each month.	17.607	6	105.642
7.	Log of procedures provided by a nursing assistant	2.916	3	8.748
8.	Working time logs for social workers	1.311	3	3.933
9.	Working time log for nursing specialists (Form No. 02/a CP, approved by the Decree No. V-1 of the Director on 14 January 2003). Once per months, at the end of each month.	17.607	6	105.642
10.	Filling of laboratory test forms.	187	3	561
11.	Working time log	12.237	4	48.948
12.	Form for assessment and monitoring of wounds. In case of wounds, filled in each time a patient is visited.	4.719	3	14.157
13.	The plan for long-term care. Survey of the patient under nursing care (Annex 1 to the *Description of the procedure for the joint provision of nursing and social services*). During the first visit by a nurse to a patient.	700	6	4.200

No.	What documents will no longer be filled?	Number of inscriptions	Time saved per inscription, in minutes	Total, in minutes
14.	The plan of daily activities (Annex 1 to the *Description of the procedure for the joint provision of nursing and social services*). During the first visit by a nurse to a patient and in case the health state of the patient changes – at least once per month.	8.400	2	16.800
15.	Log for assignment of nursing services to patients.	17.607	8	140.856
Grand Total		**98.391**		**493.487**

Source: Public Institution *Central Polyclinic.*

As a result of introduced business processes based on the use of the information system, specialists providing care services (palliative and nursing care and social assistance) to patients at home spend less time creating electronic orders for provision of nursing services at home than filling in various paper forms with repeated patient information. The system provides a possibility to use partially filled data fields and typical text templates. The information is more accurate due to reduced probability of error; besides, data are inputted with the help of various standardised data classifications. The use of specialised computerised mobile equipment improved the quality of services as it provides a possibility to transfer patient examination data and certain laboratory and instrumental measurements to the treating physician for urgent and regular diagnostics or corrections of the treatment or nursing plans. ICT helped to improve the quality of services provided to patients at home and provided a possibility for a faster transfer of patient data to physicians, which reduced the need for additional visits by physicians and nurses.

For the administrative staff of the Polyclinic, the assignment and delivery control of nursing and social services provides a possibility to analyse electronic healthcare (nursing) records formed by healthcare specialists and diagnostic data regarding measurements taken at patients' home. An additional possibility is provided for physicians to undertake timely recognition of patient health problems and prescribe an adequate treatment as well as care services at home or refer patients for inpatient services.

The benefit of the Nursing IS for the *Central Polyclinic* and its healthcare specialists:

1. Rapid and convenient exchange of information inside the personal healthcare institution: increased effectiveness of information exchanged between a family doctor, nurses and members of the palliative care team. Personal healthcare specialists no longer have to fill in various documents on services provided to patients at home. It was calculated that annual time savings will amount to 8 613 hours of working time, which can be used to provide services, training of specialists or organisation of additional services, etc.
2. Innovative mobile nursing workstations resulted in more accurate diagnostics, more effective treatment, and nursing and improved working conditions as well as time savings. The latter is related to a more rapid remote monitoring and electronic data transfer. It was calculated that the mobile equipment will bring annual time savings amounting to 4 877 hours or working time, which can be used for direct work with a patient and his/her significant others.

The benefit of the project for patients:

1. Saved time of patients and their significant others thanks to the option to remotely enrol in the personal healthcare institution and order a nursing service to be provided at home without the need to physically visit the healthcare institution;
2. Ensured more effective diagnostics as remotely supplied data are assessed in real time; urgent care can be provided at once, following doctor's recommendations;
3. Improved accessibility of nursing and palliative care services provided to patients at home as well as the provision of a package of services.

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4. eHEALTH SYSTEM IN LITHUANIA FROM THE PERSPECTIVE OF USERS

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Authors of the research study *Scope and Trends of Inclusion and Participation of Healthcare Employees and the Population in the e-health System in Lithuania*[484] maintain that the "*Programme on the Development of eHealth System of the Republic of Lithuania for 2009–2015* has been worked out with the aim to balance the existing and new emerging possibilities for the integration of information and communication technologies, national and global trends, short-term and longer-term healthcare needs so that evolutionary development of the Lithuanian e-health system would be ensured, enabling a consistent improvement in the quality of healthcare services".[485] In chapters above, it has already been noted that a large number of major and complex projects for the integration of information and communication technologies (such projects constitute the majority among those aimed at the implementation of national health informatics programmes) face challenges of meeting their roll-out deadlines, significant increase in budget costs and frequent cuts in the list of technology functionality requirements after the start of the project implementation process. In addition, more difficult problems emerge in cases when technically well-integrated IT systems are not used. Lithuania's health policy regarding e-health development as well as its focus areas, where priority is given to technical specifications, to the development of interoperability standards or flexibility of public procurement rules, are indeed not the aspects that determine successful or unsuccessful patient-focused healthcare develop-

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[484] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V.,Mačiulienė M. Scope and trends of engagement of healthcare professionals and the population in e-health in Lithuania. Scientific Research. Vilnius: Mykolas Romeris University, 2014. p. 216.

[485] An ongoing project of Mykolas Romeris University „Integrated transformations of e-Health development: stakeholder network perspective" (project code No. VP1–3.1-ŠMM-07-K-02-029), financed from EU funds.

ment. Whereas in national e-health programmes, it is namely these concepts that are quite frequently found among the key goals.[486]

When analysing the impact that the process planning and implementation has on the quality of the results, special attention should be given to the change management perspective and to the aspects of stakeholder engagement, particularly future users of currently integrated IT systems. The importance of stakeholder participation in the e-health processes has been increasingly stressed in scientific literature as the key factor in the development of an e-health system. Therefore, logically, an objective was set to find out the degree and trends of stakeholder involvement in the process of e-health development in Lithuania.

Within the period, 31 May 2013 – 30 October 2013, three sociological quantitative studies on e-health developers, implementers, and users were carried out.

Research objectives:

1. To assess the awareness of the staff of healthcare institutions regarding e-health information technologies, the extent of using such information technologies at their place of work, attitude towards e-health technologies in Lithuania and at one's own healthcare institution, peculiarities and problems of the integration of e-health technologies
2. To find out the degree and trends of including and participation of healthcare institution executives in the e-health system: to assess the awareness of healthcare institution executives regarding e-health technologies currently integrated in Lithuania, status of the integration of such technologies at their healthcare institution, attitude towards the benefit of the new technologies, problems and needs arising from this process.
3. To find out the degree and trends of including and participation of the population in the e-health system, its satisfaction with the e-health status and needs in the domain of e-health.

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[486] Rotomskienė, R. (2011). The concept of national e-Health Development process model. Social technologies. 2011, 1(2): 415–426.

Methods

The three representative quantitative studies have been carried out using quantitative sociological research methodology. Methods chosen were questionnaire-based surveys carried out as respondent interviews in the period June – October 2013. Survey target groups were selected depending on who are the main users of the e-health system. Such users were: the staff (doctors, nurses and laboratory assistants) of Lithuanian healthcare institutions, healthcare institution executives and Lithuanian population representing the general set. Instruments chosen for the research were original author-produced survey questionnaires separate from each group under research.[487] "The questionnaire for the research has been produced based on the theoretical integrated social/technical attitude concept, which is described in greater detail in the 2.3 part of the present monograph, as well as on e-health key elements[488], also, on instruments for the management of work with stakeholders, which instruments have been developed based on authors Friedman and Miles[489] and the levels of stakeholders engagement as simplified by the authors. The questionnaires were based on the logic prompted by the current e-health development range of problems found during previous qualitative researches".[490]

Data analysis has been performed using *SPSS for Windows* statistical package (version 15.0). Statistical relations between the attributes has been assessed using the Chi-square (χ^2) criterion. For the purpose of hypotheses testing, the selected level of significance was $p < 0.05$. With the aim to determine what statistical criteria should be used, the calculation was made to see whether the survey data were distributed by the normal distribution or not. To determine whether the data have a normal distribution, Kolmogorov-Smirnov Z test was calculated. Indication of whether the distribution is

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[487] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V., Mačiulienė M. Scope and trends of engagement of healthcare professionals and the population in e-health in Lithuania. Scientific Research. Vilnius: Mykolas Romeris University, 2014, p. 183-214.

[488] Dansky K. H., Thompson D., Sanner T. 2006. A framework for evaluating e-Health research. *Evaluation and Program Planning*, Volume 29, Issue 4, November, p. 397-404.

[489] Friedman, A. L., Miles, S. (2006). *Stakeholders: Theory and Practice*. New York: Oxford University Press Inc.

[490] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V., Mačiulienė M. Scope and trends of engagement of healthcare professionals and the population in e-health in Lithuania. Scientific Research. Vilnius: Mykolas Romeris University, 2014, p.12.

according to the normal distribution regulation is the result of the *p* value, i.e., if the resulting *p* value is > 0.05, the data distribution is not according to the normal regulation.

4.1. Attitude of the staff of healthcare institutions

400 specialists working in state and municipal as well as private healthcare institutions (103 public sectors and 45 private sectors) were interviewed. For the research to be representative of the opinion of the Lithuanian healthcare staff, respondents were selected proportionately from each region of Lithuania. A composite (face-to-face, by phone, e-mail) method of the interview was used respectively in case of public and private healthcare institutions offering outpatient and inpatient healthcare services. Only medical staff, i.e. doctors, nurses and laboratory assistants were interviewed. The questionnaire included 53 questions. The survey data analysis was aimed at comparing issues that reveal differences in the respondents' awareness of e-health IT systems, the degree of satisfaction and answering the needs according to the respondent's locality of residence. 45 per cent of the respondents were from major Lithuanian cities and 55 per cent from other towns and rural areas. According to the type of ownership, the share of state and private healthcare institutions that was covered by the survey was 80% and 20%, respectively. By the type of services offered, the share of healthcare institutions offering outpatient, inpatient, and mixed services was 63%, 4%, and 33%, respectively. The gender distribution of the survey respondents was 11% men and 89% women. The composition of the respondents was 47% doctors, 43% nurses, 8% laboratory assistants and 2% other staff members. In terms of age, the respondents fell into four age groups: group 1 – up to 39 years old, which accounted for 22% of the entire number of the respondents; group 2 – 40–49 years of age, which accounted for 34% of the whole number of the respondents; group 3 – 50–59 years of age, which accounted for 33% of the respondents; and group 4 – 60 years of age and older, which accounted for 11% of the entire number of the respondents.

4.1.1. Extent of using e-health systems by specialists of healthcare institutions

The survey data have revealed that e-health IT systems are used daily by 67% of the respondents, 13% of the respondents answered they use them several times a week, and as many as 8% said they have never used them yet, while the remaining part of the respondents use the system just a few times a year, does not use it at all, and 1% does not know what it is.

The specialists interviewed typically provide the following e-health services: sick leave fill-in, patient insurance status, and patient registration, statistical outpatient form online fill-in (current 025/a-LK-form). It is namely these e-health technologies that are most often used by the interviewed specialists. Using the Kruskal–Wallis test average ranges, it may be maintained that all e-health services are to the largest extent provided in Vilnius and in major cities, and to the least extent – in villages. In other cities, services that are provided to the least extent are as follows: online management of laboratory orders and/or results, patient medical record "– statistical accounting form online fill-in (anamnesis, complaints, etc.) during an outpatient visit as well as online management of prevention programmes (invitations to patients for tests, their monitoring, etc.) (**Figure 4.1**).

4.1.2. Awareness of the staff of healthcare institutions of the e-health

Respondents were asked whether their healthcare institution has a strategic action plan, envisaging installation of e-health modules nearest-term. The majority, i.e. 63%, simply do not know about such a plan. Only a small part, i.e. 20%, know that their healthcare institution has a strategic action plan with set priorities of the healthcare institution, and 7% know that their institution has a strategic action plan, however, priorities of their healthcare institution in the area of e-health are not mentioned. The survey data have shown that there is no statistically significant difference between the availability of a strategic action plan regarding e-health information systems and place of residence ($p>0.05$)[491].

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[491] *Ibid.*

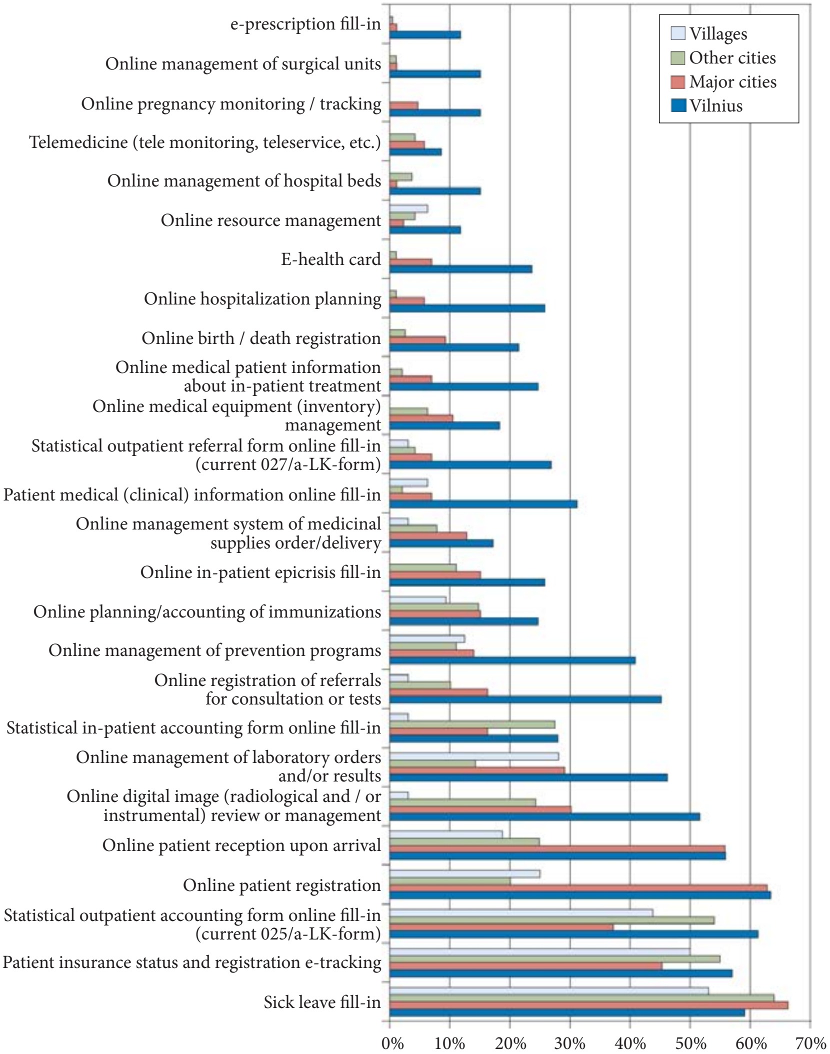

Figure 4.1. E-health services provided to residents according to their place or residence[492]

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[492] Jankauskienė, D. Jakubčionytė A. Health-care staff involvement in e-health system. *Health policy and management. Research papers*. 2014 1(6), p. 80-98

"With the aim to find out direct involvement of specialists of healthcare institutions in the implementation of information systems, they were asked, when they most often learn about any new e-health information systems planned to be launched or any other technological e-health solution. The survey results have shown that there is a statistically significant difference between learning about the planned implementation of a new e-health information system and place of residence ($\chi^2=0.769$, df=3, $p<0.05$). Healthcare institution specialists working in Vilnius learn about the implementation of a new e-health information system or any other technological e-health solution after a definite product has been chosen and after it has been presented to the staff. Respondents working in the main cities and other towns maintain that they learn during staff training arranged for the purpose of instructing how to use one or another new e-health technological solution (**Figure 4.2**)."[493]

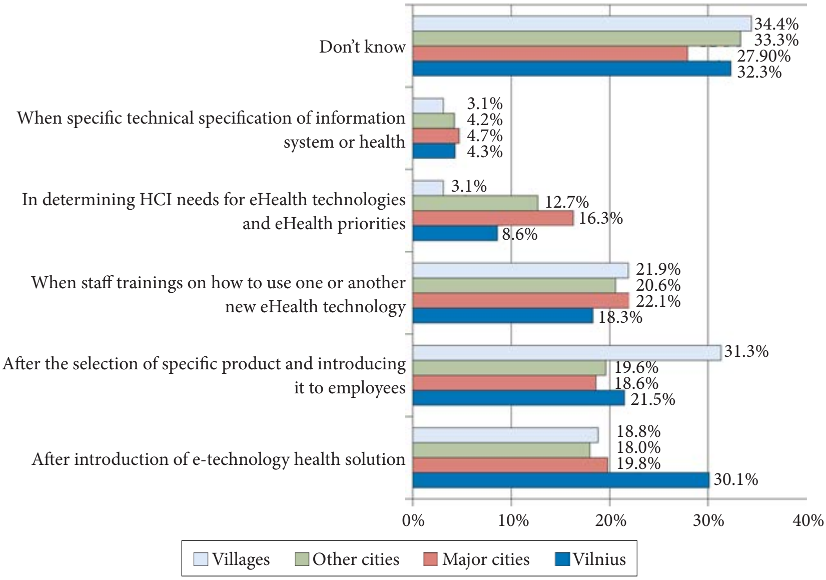

Figure 4.2. Becoming aware of the planned implementation of a new e-health information system by place of residence[494]

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[493] *Ibid.*

[494] Jankauskienė, D. Jakubčionytė A. Health-care staff involvement in e-health system. *Health policy and management. Research papers*. 2014 1(6), Pp 80-98.

Respondents were asked in what way any new e-health information system/any other technological e-health solution is most often implemented? The survey results have shown that there is a statistically significant difference between the most frequently indicated method of implementing an e-health information system and place of residence ($\chi^2=1.971$, df=3, $p<0.05$). The respondents working in Vilnius and in the countryside and those who are aware of methods of implementation maintain that a product is most often created by their healthcare institution's IT specialists, who subsequently launched the product, themselves. The respondents working in the main cities and other towns maintain that most often standard products offered by IT suppliers (IT companies) are chosen and subsequently adapted according to relevant needs of their healthcare institution (**Figure 4.3**).

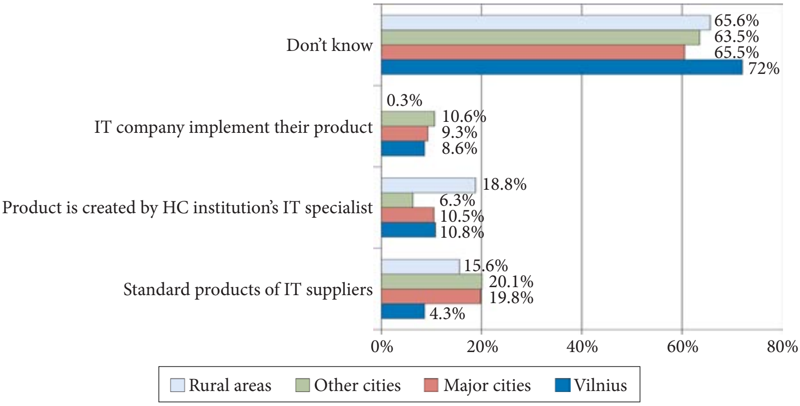

Figure 4.3. The most frequent method for e-health IS deployment[495]

4.1.3. Healthcare institution staff satisfaction with e-health

Healthcare specialists were asked to assess e-health information systems and other technological solutions already installed at their institution. The majority, i.e. 75%, of the specialists gave a positive assessment of the e-health information systems launched at their healthcare institution dur-

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[495] Jankauskienė, D. Jakubčionytė A. Health-care staff involvement in e-health system. *Health policy and management. Research papers*. 2014 1(6), p. 80-98.

ing recent years. Many of them indicated that they are convenient to use (57%), enable accumulating more precise information (54%), works can be done considerably faster (46%).

Specialists were also asked what, in their opinion, is wrong with the implementation of new e-health information systems (this question was also given to the respondents who were positive about the novelties). Nearly ¼ (23%) of the specialists indicated that new systems reduce the tempo of their work, 10% indicated that they did not meet their needs, 8% maintained that they are not convenient to use.

Attempts were made to find out whether specialists noticed any difference in their work after the launch of one or another e-health technological solution system. The survey results have shown that there is a statistically significant difference between changes that occurred after the launch of one or another e-health technological solution and the place of residence, (χ^2=9.791, df=3, $p<0.05$). **Figure 4.4** shows that respondents working in Vilnius maintain there were no adverse changes.

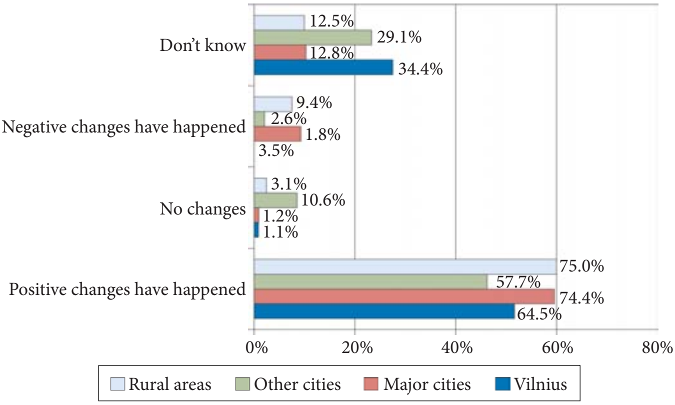

Figure 4.4. Changes that took place following the deployment of one or another e-health technological solution by place of residence[496]

Respondents were asked to indicate positive and negative changes in more detail. Among positive changes, specialists indicate an improvement in the organisation of work (41%) and a decrease in hard-copy documenta-

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[496] Jankauskienė, D. Jakubčionytė A. Health-care staff involvement in e-health system. *Health policy and management. Research papers*. 2014 1(6), p. 80-98.

tion volume (32%) (**Figure 4.5**), and among negative ones – information overlap both in the electronic and hard-copy form (51%) (**Figure 4.6**).

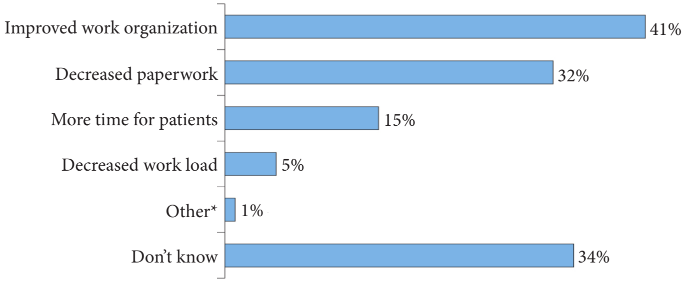

Figure 4.5. Positive changes related to the deployment of the e-health system[497]

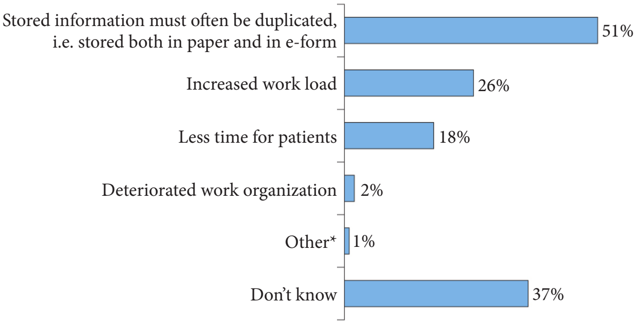

Figure 4.6. Negative changes related to the deployment of the e-health system

The survey results have shown that there is no statistically significant difference between positive or negative assessment of the changes and the place of residence ($p>0.05$).

4.1.4. Needs of healthcare institutions' specialists in the area of e-health

There were open-ended questions about types of services that Lithuania and healthcare institutions lack the most. Only a small part of healthcare specialists are of the opinion that Lithuania has a sufficient range of

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[497] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V.,Mačiulienė M. Scope and trends of engagement of healthcare professionals and the population in e-health in Lithuania. Scientific Research. Vilnius: Mykolas Romeris University, 2014, p.78.

e-health information systems. **Figure 4.7** shows that most frequently three types services were indicated as the ones that the population lack the most: electronic prescribing – 12%, electronic health record – 9%, online patient pre-registration – 8%.

The survey respondents were asked to indicate what, in their opinion, is of key importance in the implementation of new e-health information systems. 59% of the respondents indicated that when implementing new e-health information systems/other technological e-health solutions it is highly important that the new e-health information system/other technological e-health solutions would be adapted according to the specific needs of a healthcare institution in terms of organising the work – 59%, as well as staff training – 50% (**Figure 4.8**).

The survey respondents were asked to indicate to whom they turn for assistance if they are not yet able to use the new e-health information system or any other technological solution. The respondents mainly tend to turn to their healthcare institution's IT specialist (47%) and colleagues (37%). Similar responses were in the case of questions as to whom specialists turn for assistance if any uncertainties occur in connection with any definite e-health information problem or the use of any other technological solution. The survey results indicate that most frequently specialists seek help from an IT specialist of a healthcare institution (49%) or from a colleague (29%).

"With the aim to find out the needs of specialists in the e-health system and their involvement in its implementation, they were asked to indicate with whom they most often discuss possibilities for the development of e-health technological solutions at their healthcare institution. The survey results have shown that there is a statistically significant difference in discussing possibilities for the development of e-health technological solutions and place of residence (χ^2= 8.526, df=3, p= 0.036). We see that the respondents working in the countryside and in other towns most frequently turn to the executives of their institutions or the executives of their subdivision within the healthcare institution, whereas the respondents in Vilnius and in the main cities turn to their colleagues" (**Figure 4.9**).

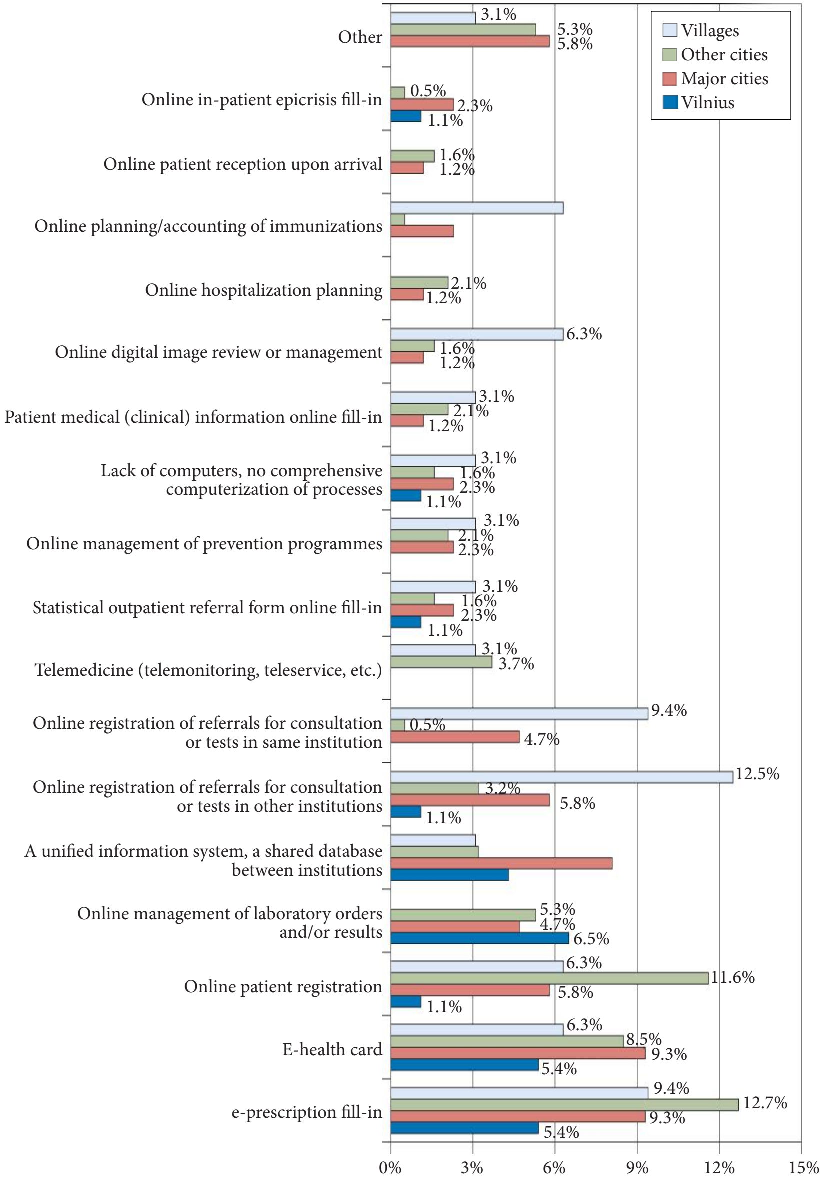

Figure 4.7. Greatest lack of e-health IS and technological solutions[498]

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[498] Jankauskienė, D. Jakubčionytė A. Health-care staff involvement in e-health system. *Health policy and management. Research papers*. 2014 1(6), p. 80-98.

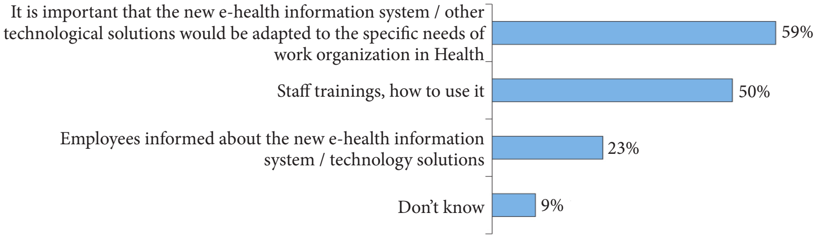

Figure 4.8. What issues are the most important in the deployment of new e-health IS/other technological e-health solutions? [499]

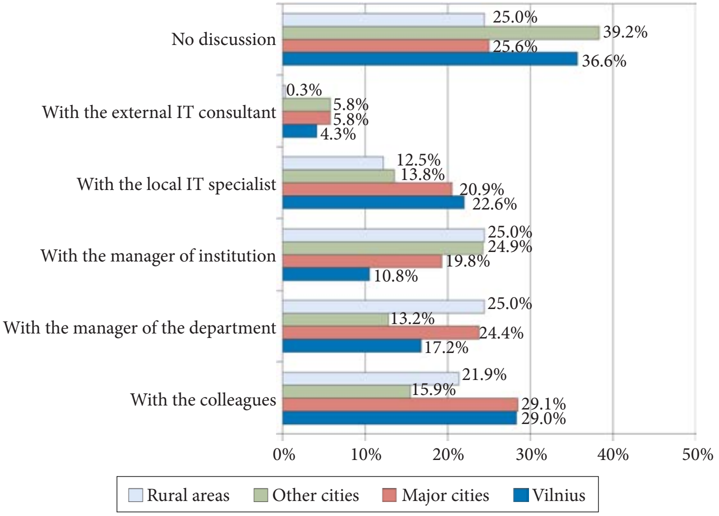

Figure 4.9. Discussion on possible development of e-health technological solutions by the place of residence[500]

Respondents were asked whether they have provided any proposals to their health care institution as to what kind of modules should be installed in future, whether their proposals were used (**Figure 4.10**). Only a small share, i.e. 7% (N=26), provided proposals as to what modules should be installed in future.

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[499] Jankauskienė, D. Jakubčionytė A. Health-care staff involvement in e-health system. *Health policy and management. Research papers*. 2014 1(6), p. 80-98.

[500] Jankauskienė, D. Jakubčionytė A. Health-care staff involvement in e-health system. *Health policy and management. Research papers*. 2014 1(6), p. 80-98.

Figure 4.10. Provision of proposals on modules[501]

"In about one-half of the cases, the proposals were used, however, in absolute terms this is a small number (N=14).

The respondents (N=14), whose proposals were used, were asked to assess the way in which their proposals were used (**Figure 4.11**).

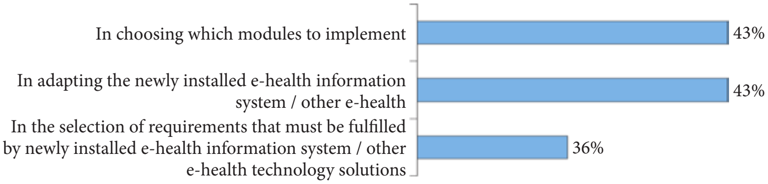

Figure 4.11. Use of proposals in the deployment of e-health[502]

As compared to a previous research carried out at a relevant order of the Ministry of Health of the Republic of Lithuania (MoH), a positive trend is observed. In the analysis undertaken by the MoH in 2011 it is stressed that only one-fourth (25%) of the surveyed institutions have installed the healthcare institution information system, excluding SVEIDRA, out of the institutions that do not yet have the healthcare institution information system about 65% indicated that they plan to install it in future, and 19% of the institutions have already prepared their system project. The main reasons why some of the healthcare institutions have not yet installed the healthcare institution information system were related to insufficient preparedness of their medical staff (as future user of the information systems) to use the information systems, insufficient qualifications of the IT personnel of the institution and inadequate number of the institution's IT staff. A large part of the surveyed institutions indicated that there are problems also related to the absence of clarity regarding the benefit of having an IT system and that

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[501] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V.,Mačiulienė M. Scope and trends of engagement of healthcare professionals and the population in e-health in Lithuania. Scientific Research. Vilnius: Mykolas Romeris University, 2014, p. 88.

[502] Jankauskienė, D. Jakubčionytė A. Health-care staff involvement in e-health system. *Health policy and management. Research papers*. 2014 1(6), p. 80-98.

too little priority is given to the implementation of an IT system its use[503]. Our research indicates that still the majority of problems have remained.

In a summary analysis of the survey based on the Kruskal-Wallis test average ranges allows maintaining that the extent of e-health services provided in Vilnius and in the main cities is the largest, while that in villages is the lowest. E-management of online refill of laboratory orders and/or results, online entering patient record and medical (clinical) information (anamnesis, complaints, etc.) during outpatient visits as well as e-management of preventive programmes (call for testing of patients, their monitoring, etc.) – these services are provided to the lowest extent in other towns.

As regards a strategic activity plan that envisages installation of e-health modules, the majority of the respondents, i.e. 63%, are just unaware of them, only a small part of them, i.e. 20% know that their healthcare institution has a strategic action plan with its set priorities, and 7% know that they have a strategic action plan, but the healthcare institution's priorities in the domain of e-health are not mentioned. In the MoH e-health system implementation analysis of the year 2011, 8% of the surveyed institutions indicated that they have an approved IT strategy document. It is interesting to note that some of the country's major healthcare institutions did not have a document of this type. Unavailability of strategic documents may potentially be related to one of more important IT system implementation and IT infrastructure maintenance problems of healthcare institutions: too low priority for the implementation/use of IT systems. Among other key problems related to the implementation of IT systems and maintenance of IT infrastructure, a lack of funds and insufficient computer literacy[504] of an institution's medical staff, i.e. future user, should be mentioned. The recent year study shows an improvement in the situation. However, the above-mentioned problems remain.

In response to a question, when they typically learn about the implementation of new e-health information systems/technological e-health solutions at their healthcare institution, specialists equally indicated the following four alternatives: they learn after a technological e-health solution has already been implemented (21%); after a definite product has been

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[503] MoH of the Republic of Lithuania Final report on implementation of national e-health system, Vilnius, 2011, p. 118.

[504] MoH of the Republic of Lithuania Final report on implementation of national e-health system, Vilnius, 2011, p. 125 - 126.

selected and introduced to the staff (21%); during arranged staff training on how to use one or another new e-health technological solution (21%); when their healthcare institution is in the process of determining its needs for the e-health information systems/technological solutions and the institution's e-health development priorities (19%). The survey results have shown that there is a statistically significant difference between learning about planned implementation of a new e-health information system and place of residence. The respondents working in Vilnius maintain that they learn after a technological e-health solution has been implemented, while those working in the countryside – after selecting a definite product and after its presentation to the staff. Respondents working in major cities and other towns maintain that they learn during arranged staff training on how to use one or another new e-health technological solution.

The survey has been aimed not only at finding out when, but also how specialists learn about planned implementation of a new e-health information system/planned implementation of any other technological e-health solution at their place of work – most often they learn at their healthcare institution meeting (58%), other sources were mentioned considerably less frequently – learning from the executive of IT unit/IT specialists of their healthcare institution, from colleagues (13%), by regular communication of the executive of their institution with staff be e-mail (4%), by informing in the healthcare institution's information publication for its staff (2%)[505].

The research results have shown that there is a statistically significant difference between the most frequently indicated way of implementing e-health information systems and place of residence ($p<0{,}05$). The respondents working in Vilnius and in the countryside and aware of the implementation methods maintain that a product is most often created by their healthcare institution's IT specialists, who subsequently launched the product themselves. The respondents working in major cities and other towns maintain that most often standard products offered by IT suppliers (IT companies) are chosen and subsequently adapted according to relevant needs of their healthcare institution.

"The majority (75%) of specialists positively assessed the e-health information systems launched at their healthcare institution during recent years.

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[505] Jankauskienė, D. Jakubčionytė A. Health-care staff involvement in e-health system. *Health policy and management. Research papers*. 2014 1(6), p. 80-98.

Many of them indicated that they are convenient to use (57%), enable accumulating more precise information (54%), works can be done considerably faster (46%). Nearly 1/4 (23%) of the specialists indicated that new systems reduce the tempo of their work, 10% indicated that they did not meet their needs, 8% maintained that they are not convenient to use. Among positive changes, specialists indicate an improvement in the organisation of work (41%) and a decrease in hard-copy documentation volume (32%), and among negative ones – information overlap both in the electronic and hard-copy form (51%). The survey results have shown that there is no statistically significant difference between the assessment of the e-health information system implemented at an institution and place of residence, however, a statistically significant difference has been found between changes that occurred after the implementation of one or another e-health technological solution and location of residence (0.02, $p<\alpha$). It has been found that the respondents living in Vilnius maintain that there were no adverse changes. Whereas the largest number of adverse changes were indicated in major cities. The respondents in other towns indicated hat there were no changes or difficult to say"[506]. In the e-health implementation analysis undertaken by the MoH in 2011, for the assessment of IT needs the respondents were also asked to identify key elements for successful implementation and use of information systems at their institution. 93% of the respondents agreed or partly agreed with the statement that the key element is ensuring sufficient financing, 92% – that it is qualifications improvement, 91% – that exchange of expertise with similar type institution is the key. It is important to note that the major part of the respondents (85%) agreed that there are problems also due to a lack of methodological support[507].

"Only a small part (16%) of healthcare specialists is of the opinion that Lithuania has a sufficient range of e-health information systems. The main three services that the population lack the most: online filling out the prescription form – 12%, electronic health record – 9%, online patient registration – 8%. The survey results have shown that there is no statistically significant difference between the lack of the indicated services and place

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[506] *Ibid.*

[507] MoH of the Republic of Lithuania Final report on implementation of national e-health system, Vilnius, 2011, p. 118, 126.

of residence. Average ranges indicate that similar drawbacks in e-health services are assessed in all localities"[508]. In the year 2011 e-health system implementation analysis of MoH of the Republic of Lithuania, the greatest need to use information systems is seen for the following activities: statistical outpatient (74%), patient registration (66%), also, patient check-in (64%), filling out referral forms for consultation, test or treatment at another institution (66%) and filling out patients' outpatient information (65%), filling out prescription forms (61%)[509].

"The most important thing in the implementation of new e-health information systems/other technological e-health solutions is to have a solution adapted according to definite needs of a healthcare institution in terms of organising its work – 59%, as well as staff training – 50%. If specialists do not know yet how to use a new e-health information system or any uncertainties have occurred when using it, most often they turn to the healthcare institution's IT specialist or a colleague. The survey results have shown that there is no statistically significant difference between turning for assistance in using the new e-health information system and place of residence ($p>\alpha$). Average ranges indicate that respondents tend to turn similarly for assistance regarding the use of the e-health information system in all localities, and most frequently they turn to their healthcare institution's IT specialist and colleagues.

Possibilities for the development of e-health technological solutions at their institution are most often discussed with colleagues, head of the institution, executive of the institution's subdivision, healthcare institution's IT specialists. The survey results have shown that there is a statistically significant difference in discussing possibilities for the development of e-health technological solutions and place of residence (0.036, $p<\alpha$). It has been noticed that the respondents working in the countryside and other towns more frequently tend to turn to executives of their healthcare institution or to executives of their institution's subdivisions, whereas the respondents from Vilnius and other major cities – to their colleagues.

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[508] Jankauskienė, D. Jakubčionytė A. Health-care staff involvement in e-health system. *Health policy and management. Research papers*. 2014 1(6), p. 80-98.

[509] MoH of the Republic of Lithuania Final report on implementation of national e-health system, Vilnius, 2011, p. 118, 120.

The majority of staff do not know what type of e-health modules will be installed at their healthcare institution in the nearest term. Only 1/5 of specialists indicated they had been asked about the installation of new modules at their institution. The share of those who submitted proposals as to what type of modules should be installed in future was still smaller. Half of them indicated that their proposals were taken into account. The survey results have shown that there is no statistically significant difference between using proposals regarding e-health information systems and place of residence"[510].

4.2. Attitude of healthcare institutions' executives

The second quantitative study included a survey of 77 healthcare institution executives in charge of public and private healthcare institutions. Seeking that the study would represent the opinion of executives of all Lithuanian healthcare institutions, respondents were chosen proportionately from public and private healthcare institutions of each region in Lithuania offering, respectively, outpatient and inpatient healthcare services. A combinatory (face-to-face, by phone, e-mail) method of the interview was used. The survey was carried out using an original questionnaire[511] developed by authors based on the logic dictated by the current range of problems: level of interest in e-health, content of the interest, internal social networks of the organisation that represents the interests, external social networks of the organisation that represents the interests, and the organisational management system of the organisation that represents the interests. On this basis, an original questionnaire was developed. The questionnaire included 53 questions.

"Analysis of the survey allows maintaining that executives of the healthcare institutions that develop e-health technologies are well enough familiar with e-health services offered in Lithuania – all the listed e-health technological solutions were known to at least 1/3 of the respondents. The respondents also indicated that what they lack the most in the Lithuanian

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[510] Jankauskienė, D. Jakubčionytė A. Health-care staff involvement in e-health system. *Health policy and management. Research papers*. 2014 1(6), p. 80-98.

[511] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V.,Mačiulienė M. Scope and trends of engagement of healthcare professionals and the population in e-health in Lithuania. Scientific Research. Vilnius: Mykolas Romeris University, 2014, p.194-206.

e-health system is online filling out the prescription form, online patient registration, and electronic health record. Anyway, nearly half of them could not answer the question, which is an indication that by far not all institutions implement and are interested in e-health system. Online tracking of patient insurance status and patient enrolment as well as filling out sick leave forms – these are the two services that executives of institutions mention most frequently among the ones mainly provided by the institutions they are in charge of. Based on the survey results, it may be concluded that the range of services is influenced by the size (in terms of the number of employees) of a healthcare institution and locality – the larger the number of employees and the larger the city, the wider the range of services. Also, it can be observed that public and municipal healthcare institutions offer a broader range of services compared to private companies. The executives have also indicated that a lack of funds and human resources/competencies are the main reasons why the range of e-services is not as large as one would like it to be. In rural areas and small institutions, executives more often indicated a lack of competencies[512].

In the opinion of the majority of healthcare institution executives, the action/strategic plan of the institution they are in charge of envisages the development of e-health information systems/other e-health technological solutions. In their assessment of the level of financing, more than half of the executives indicated that the share of the budget allocated for e-health development is up to 5%. Only 3.9% of the healthcare institutions allocate more than 5% of their budgets. 16% of the respondents indicated that no funds are allocated for e-health at all. Key funding source for e-health development and related activities that were most frequently indicated by executives of institutions are funds of the institution itself (74%), however, in 1/3 of cases the source of financing is the EU structural funds. However, none of the respondents from private institutions indicated financing from the EU structural funds[513].

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[512] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V.,Mačiulienė M. Scope and trends of engagement of healthcare professionals and the population in e-health in Lithuania. Scientific Research. Vilnius: Mykolas Romeris University, 2014, p.139-146.

[513] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V.,Mačiulienė M. Scope and trends of engagement of healthcare professionals and the population in e-health in Lithuania. Scientific Research. Vilnius: Mykolas Romeris University, 2014, p. 94-146.

The majority of the executives indicated that the development of e-health information systems/other e-health technological solutions is included in the action/strategy plan of their institution, however, only 1/5 of the healthcare institutions' staff gave a positive answer to an analogous question. This statistically significant difference indicates that employees of the institutions do not have sufficient information on strategic innovation solutions at their institutions. Also, it is worth mentioning that 1/3 of the executives of private institutions indicated that no development of e-health services has been envisaged, and 1/4 indicated that no strategic plan exists at all. In the opinion survey of executives of institutions, similarly as in the case of staff opinion survey, in the majority of healthcare institutions decisions as to what e-health information systems should be implemented is taken by the executive of the institution. More than half of the respondents indicated that in the process of deciding what e-health systems should be applied the national e-health development strategy/action plan is taken into consideration, however, nearly in ½ of cases the executives maintained that the institution employees are consulted with. Only 1/5 of them seek advice from IT.

Analysing answers of the respondents by healthcare institution's type of ownership, higher impact of state-regulated institutions and national documents on decision-making is observed, which indicates that the system participants tend to conform to the national e-health policy.[514]

Attempts to understand e-health system management problems have revealed that more than half of the executives indicated their healthcare institution has no special health care institution IT unit. In nearly 1/5 of the institutions, the IT unit has 1 to 3 employees. Only 12% of the institutions have more than 4 employees. The results in Vilnius are highly different from those in other localities in Lithuania. In the capital city, only 1/5 of healthcare institutions have no IT unit, whereas in rural areas as much as 85% institutions have no IT unit. As a result, in more than half (52%) of the institutions the service of technical incidents elimination is available within a period shorter than the working hours of the institution, and in most cases (46%) this service is provided by an external provider. As regards responses of the executives by their healthcare institution locality, similar pattern of insufficient services can

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[514] *Ibid.*

be seen, the only exception being Vilnius, wherein as many as 71% of cases services are provided by the healthcare institution's internal IT unit[515].

E-health information systems are most often (43%) purchased from an external supplier, and are standard e-health information systems that are subsequently adapted to the healthcare institution's needs. As much as 1/3 of the respondents indicated that they have never had a chance to choose any e-health technological solutions. More than half (55%) of the respondents indicated that such an e-health solution is chosen, which best suits the requirements of the Territorial Health Insurance office, National Health Insurance Fund and the MoH. Only large institutions (with 501–1000 employees) may be singled out, which compared to the smaller institution more often try to find out which product is the best for the market and opt for it. The same trend can be seen in Vilnius city compared to other localities. Executives indicated more or less the same number of difficulties that arise after taking a decision to implement one or another e-health information system/any other e-health technological solution: changing the process of organising the work, staff training, drawing up e-health technological solution specification for public procurement, selection of the e-health technological solution[516].

An assessment of the executives' satisfaction with e-health services allows maintaining that satisfaction of the healthcare institution executives with relevant e-health solutions and activities differs, depending on the size and locality of the institution. Executives of major healthcare institutions where the number of employed individuals is more than 501 and where e-health technologies are better developed, positively assessed financing, training and consultancy as well supply with computers and other means, however, their assessment of compatibility of e-health information systems or e-health technological solutions already installed with external healthcare institutions/information systems of other institutions/ability to exchange data electronically was negative (bad/rather bad than good). At the same time, executives of small and medium healthcare institutions (healthcare institutions with staff numbering 10 to 500 persons) – gave a nega-

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[515] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V., Mačiulienė M. Scope and trends of engagement of healthcare professionals and the population in e-health in Lithuania. Scientific Research. Vilnius: Mykolas Romeris University, 2014, p. 94-146.

[516] *Ibid.*

tive assessment of financing and supply with computers and other means, indicating it as inadequate. The survey data lead to an insight that one of the main near-term challenges in the development of Lithuania's e-health aiming to secure successful further e-health development is to decrease the existing inequities.

Satisfaction with e-health development is directly related to the success of the implemented new information systems or any other technological solutions. The success of new information systems depends not only on their application for specific needs of an institution (62%) or on actual benefit which is manifest in a lower workload (49%). Emphasis is on whether the new information system or any other technological solution answers the needs and abilities of the information system users, therefore, staff training to use the installed e-health technological solutions is inseparable not only from the success of the new information system implemented by the healthcare institution, but also determines overall satisfaction with new technological solutions at the institution (36%)[517].

In their assessment of solutions and activities within healthcare institutions they are in charge of, the opinion of the executives was not homogeneous. The majority of the respondents, by the number of supporters, positively assessed the quality of e-health technological solutions already implemented (60%), training and consultations (47%), planning of the e-health technological solutions (38%). In the opinion of the respondents, the strongest dissatisfaction arises in relation to allocated financing (45%). In this respect, the largest divide between the respondents giving a positive and negative assessment should be stated. Financing is positively assessed by a mere 23% of the respondents. The share of the respondents who consider financing as insufficient was more than double (45% of the respondents), whereas 31 % answered it was hard to say[518].

“Analysis of the survey data shows that there are several reasons for the healthcare institution executives' positive assessment of the e-health information systems installed. First, new technological e-health solutions determine the better quality of services provided by a healthcare institu-

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[517] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V., Mačiulienė M. Scope and trends of engagement of healthcare professionals and the population in e-health in Lithuania. Scientific Research. Vilnius: Mykolas Romeris University, 2014, p. 94-146.

[518] *Ibid.*

tion (47%). Second, the institution's capability to service a larger number of patients without increasing the resources available has grown (25%) and, as a healthcare institution seeks to respond to changes more promptly, closer teamwork of specialists has been induced (12%)"[519].

A more in-depth analysis of answers of the respondents, who negatively assessed the e-health solutions implemented, has revealed that it is not the e-health solution itself or its implementation that is negatively assessed, but the processes related to the implementation. For example, employee resistance to changes – certain employee groups (older-age employees) avoidance to use the system installed. Another aspect that conditioned a negative attitude is a lack of communication with IT companies or miscommunication, resulting in the installed e-health information system that does not answer the needs of its users[520].

"Executives of healthcare institutions in Vilnius and other major cities give a positive assessment of the installed e-health information systems and other technological solutions, whereas those of healthcare institutions in smaller cities and in rural areas, possibly due to a lack of resources and competencies, also point out negative aspects influencing a slow-down in the institution's activities, i.e. technological e-health solutions are relatively considered to be labour capacity decreasing factors"[521].

It is obvious that the success of the e-health development process does not proportionately increase as a result of the mere implementation of e-health information systems or new technological e-health solutions. It is a process with a tight dependency relationship to various stakeholder groups and depends on the efforts taken by a healthcare institution itself. Healthcare institutions carry out e-health services to a rather limited extent. Only 12 % of the respondents maintained that their healthcare institutions carried out regular (4%) and one-off (8%) studies. Thus, it is not considered to be an integral part of e-health. The main indicated reasons, why no studies on the use of e-health services are undertaken, may be grouped into three categories. First – seeing no need, an attitude that a large workload leaves no time for studies and human resources are

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[519] *Ibid.*

[520] *Ibid.*

[521] *Ibid.*

insufficient. Second – it is still the stage (early stage) of e-health services implementation, i.e. the healthcare institutions where e-solution implementation work has just started, believe it's too early to start any studies. Third – a negative attitude towards e-health development, the system installed is not used. Also, a lack of funds for such studies by the institutions has been indicated.

Anyway, despite the fact that with regard to the installed new e-health solutions the healthcare institutions carry out studies on a limited scale, in the opinion of healthcare institutions' executives, the level of employee satisfaction is high (64% of the respondents believe that their healthcare institution employees are satisfied/rather satisfied than dissatisfied with the information systems installed. Key factors that determine a positive attitude of the employees: positive impact on the healthcare institution, an increase in accessibility of services and their quality, improvement in the conditions of work for the employees and increasing motivation.

Attempts have been made to find out the main problems of dissatisfaction in the implementation of e-health system. The respondents who indicated that employees of the institutions they are in charge of are dissatisfied with the new information systems installed maintained that the major factor causing dissatisfaction are technical interferences/errors leading to a slow-down of work and a waste of time costs for the elimination of errors. Also, a lack of functionalities of the new information systems and overlap of work (in cases where analogous documents must be filled out both in a soft- and hard-copy version) was indicated.

"The survey data disclose that in order to increase satisfaction with e-health development, it is necessary to overcome one of the main obstacles – to stress the importance of the stakeholders' role in the development and in the implementation of the national e-health system. It is namely the involvement of stakeholders, which is – according to the study data – an obviously non-existent process in healthcare institutions that determines dissatisfaction and fundamental development errors. There are just a few healthcare institutions that perform not only analysis of their staff opinion and needs regarding information systems, but also surveys of their patient opinions and needs (66% of the respondents' answer to the question "Are your patients of your healthcare institution satisfied with the e-health services provided by your healthcare institution?" was 'hard to say')"[522].

As regards the e-health system impact on the management processes, the respondents who answered that patients of the healthcare institutions they are in charge of positively assess the e-health services provided, indicated the following main reasons: speed of servicing or a service (the respondents maintained that patients particularly highly appreciate the online registration service), wider possibilities and increasing quality of services. Executives of healthcare institutions maintain that the main reasons behind the patients' negative attitude towards e-health services are similar to those that cause hostility of healthcare institution employees' towards e-health elements: frequent interferences, time costs and information mismatch.

"It should be stated that over five recent years healthcare institutions have had intensive e-health development, determined by a rise in the number of e-health development projects. The majority of the respondents (71%) confirmed that within five recent years new e-health information systems as well as other e-health technological solutions have been implemented at the healthcare institutions they are in charge of. Within the analysed five-year period, among the e-health new technological solutions indicated by the executives, the ones that were mentioned most often included: sick leave fill-in (33% of the respondents) and installation of SVEIDRA and its sub-system classifiers (APAP; RSAP; SPAP, etc.) (25% of the respondents). A positive trend has been observed, as compared to the analysis carried out by the Ministry of Health of the Republic of Lithuania (MoH) in 2011, where only a fourth (25%) of the surveyed institutions had an information system, excluding SVEIDRA, installed at their healthcare institution, that about 65% of the healthcare institutions that still had no information system indicated that they plan to implement it in future and 19% of the institutions have already drafted a system project"[523].

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[522] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V.,Mačiulienė M. Scope and trends of engagement of healthcare professionals and the population in e-health in Lithuania. Scientific Research. Vilnius: Mykolas Romeris University, 2014, p. 94-146.

[523] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V.,Mačiulienė M. Scope and trends of engagement of healthcare professionals and the population in e-health in Lithuania. Scientific Research. Vilnius: Mykolas Romeris University, 2014, p. 94-146.

4.3. Attitude of the population

In the third empirical quantitative study, with the aim to find out the attitude of the population, respondents were asked to answer 37 questions. The survey target group was Lithuanian residents 18–90 years of age. The survey sample size is 1000 respondents. Multi-stage probability sampling was applied so that each resident of Lithuania could have the same probability of being interviewed. Data have been collected during an interview at the respondent's home.

Demographic characteristics of the respondents: 45 per cent – men, 55 per cent – women. The survey was carried out in: Vilnius, Kaunas, Klaipėda, Šiauliai, Panevėžys, Druskininkai, in the districts of Kaunas, Alytus, Šakai, Pakruojis, Utena, Tauragė, Švenčionys, Raseiniai, Kupiškis, Molėtai, Akmenė, Rokiškis, Kretinga, Šilutė, Telšiai, Mažeikiai, Marijampolė, Trakai and Ukmergė. The survey was carried out in 18 towns and 55 villages: 46 per cent of the respondents lived in Lithuania's major cities, 54 per cent in other cities, towns and rural areas. Age of the respondents: 38 per cent up to 39 years of age; 18 per cent aged 40–49; 17 aged 50–59; 27 per cent were from 60 to 90 years of age.

It has been found that the majority of the population have heard about e-health services. A considerably higher number of those who have heard or are aware of e-health services is among the respondents within higher education, within higher-income group, residents of Vilnius, whereas individuals without secondary education, village people, the unemployed are the ones that are least aware of these services.

The share of those who are not users of e-healthcare services is not large – only 17 per cent. (**Figure 4.12**). The share of those who have used them only once is 16 per cent, and modal number of using is 2 to 5 times – 37 per cent, and the share of the population who have used them six and more times is 27 per cent.

It indicates a rather positive trend in the context of a rapid development of e-health innovations.

Do you use and how often have you used healthcare services in the past two years, in per cent

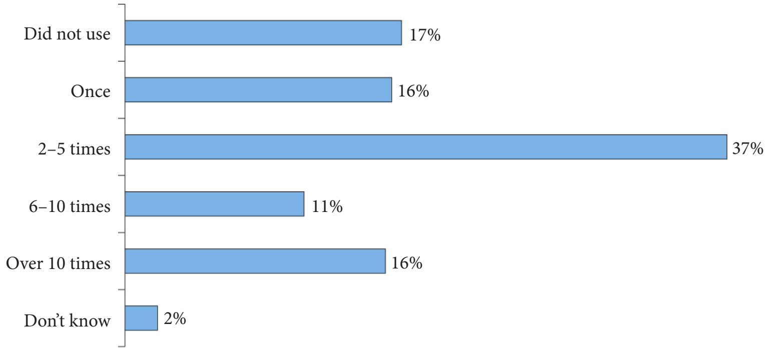
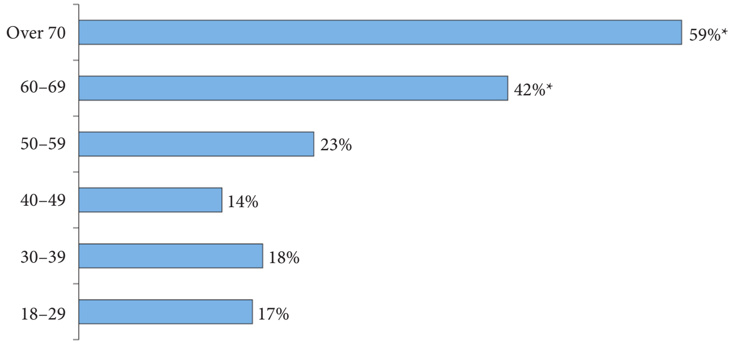


Figure 4.12. Use of e-health services over the past 2 years, in per cent

Among those visiting six or more times (conditionally such visiting may be considered frequent) are 55 per cent of the population, whose health is poor/rather poor than good (for comparison – 19 per cent, whose health is good/rather good than poor). The portion of such visitors is larger among residents of the main cities – 32 per cent (for comparison, 22 per cent – district centre residents, and 2 per cent – village people) (p <0.05). It is natural that frequent use of healthcare services depends on age (p <0.05) (**Figure 4.13**).



* Difference is significant if p <0.05

Figure 4.13. Dependence of frequent use of healthcare services (6 and more times per year) on age, in per cent

In the group up to 60 years of age, the intensity of using healthcare services changes slightly, and above 60 years of age – there is strong growth in intensity. Changes in the share of those who have not used healthcare services at all are slight: even young people, whose health is the best, go for a health check only to when obtaining a driver's license, getting a job, etc.[524]

14 e-health services that at present are already implemented or partly implemented in Lithuania have been analysed (see **Table 4.1**).

The best known (more than half of the population) is online booking for an appointment – e.registration. From half to a fourth of the population know about online sick leave fill-in, SMS/e-mail appointment reminders, online registration for patient referral for consultation within the same medical institution, digital image storing, online laboratory test orders, and online patient referral for consultation within another medical institution. Individuals with higher education are significantly better aware of these services[525].

Table 4.1. Awareness and use of the population in relation to each type of e-health services

No.	eHealth service	Part of population that is aware of the service		Part of population that is aware of and uses the service	
		N	%	N	%
1.	Online registration for a doctor's appointment	660	66.0	294	45.0
2.	Patient receives a reminder about doctor's appointment via SMS or e-mail	353	35.3	167	47.4
3.	Treating doctor makes online referrals for consultation, tests or treatment to specialists of the same healthcare institutions	334	33.4	157	47.0

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[524] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V.,Mačiulienė M. Scope and trends of engagement of healthcare professionals and the population in e-health in Lithuania. Scientific Research. Vilnius: Mykolas Romeris University, 2014, p. 147-166.

[525] *Ibid.*

No.	eHealth service	Part of population that is aware of the service		Part of population that is aware of and uses the service	
		N	%	N	%
4.	Treating doctor fills in and sends referrals for consultation, test or treatment to another healthcare institutions electronically	273	27.3	93	34.1
5.	Treating doctor/nurse undertakes electronic administration of medical information on inpatient care (anamnesis, complaints, etc.)	237	23.7	76	32.2
6.	Treating doctor/nurse orders laboratory tests/receives results electronically	283	28.3	140	49.5
7.	Treating doctor/nurse stores and/or views digital images electronically (i.e. results of radiologic and/or instrumental tests)	289	28.9	147	50.9
8.	Treating doctor fills in prescriptions electronically	129	12.9	21	16.3
9.	Treating doctor plans hospitalisation electronically (for surgical or therapeutic treatment, etc.)	152	15.2	36	23.7
10.	Treating doctor/nurse undertake electronic planning of immunoprophylaxis (vaccination) and/or related accountability documents	114	11.4	19	16.7
11.	Treating doctor uses telemedicine (telemonitoring, tele-services, etc.)	108	10.8	27	25.0
12.	Treating doctor undertakes electronic monitoring of the course of pregnancy	107	10.7	17	15.9
13.	Patient has a possibility to view his electronic health record	137	13.7	24	17.5
14.	Treating doctor fills in the statement on the leave of absence electronically	428	42.8	191	44.6

Source: Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V., Mačiulienė M. Scope and trends of engagement of healthcare professionals and the population in e-health in Lithuania. Scientific Research. Vilnius: Mykolas Romeris University, 2014, p.156.

Three services that are best known to the Lithuanian population include online registration-booking for an appointment (N = 660), online sick leave filling in by the treating physician (N = 428) and SMS/e-mail appointment reminders to the patient (N = 353). These services are used, respectively, by 45.0 per cent (N = 294), 44.6 per cent (N = 191) and 47.4 per cent (N = 167) of the population aware of e-health services.

"The survey has shown that women are more aware of e-health services (from 57.9 per cent to 60.8 per cent) compared to men (from 39.2 per cent to 42.1 per cent) (depending on the service, $p = 0.004$; $p = 0.007$). From 33.3 per cent to 41.4 per cent of the respondents using e-health services are men, and from 58.6 per cent to 66.7 per cent are women (depending on the service, $p = 0.053$; $p = 0.741$; $p = 0.939$), however, no statistically reliable difference between the gender and use of e-health services has been found."[526]

So far, the regional scale of the use of e-health services by the population covers only major cities. City residents are both more aware of e-health services (from 55.4 per cent to 59.9 per cent; $p \leq 0.001$) and use them to a wider extent (from 61.3 per cent to 67.3 per cent; depending on the service, $p = 0.007$; $p = 0.012$). From 40.1 per cent to 44.6 per cent of the respondents who are aware of e-health services live in other towns or villages, and the share of such individuals among the respondents who are users of e-health services is from 32.7 per cent to 38.7 per cent.[527]

"Awareness of e-health services ($p \leq 0.001$) and the use of them ($p \leq 0.001$) depends on age – these services are better known and are more frequently used by younger age population. Respondents up to 29 year of age made a fourth of the population aware of the services (from 21.3 per cent to 26.6 per cent, the group of 30 to 39 year-olds made from 17.2 per cent to 20.7 per cent of such individuals, the group of 40 to 49 year-olds made from 19.4 per cent to 24.1 per cent, that of 50 to 59 year-olds made from 15.0 per cent to 18.5 per cent, that of 60 to 69 year-olds made from 11.0 per cent to 12.1 per cent, and 70 year-olds and older – from 4.9 per cent to 9.2 per cent. Respondents up to 29 years of age accounted for a third of the population using the services (from 24.2 per cent to 34.1 per cent), the group of 30 to

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[526] Mikulskienė, B., Coronkutė, E., E-health service user portrait in Lithuania. Health policy and management. Research papers. 2014 1(7), p. 31-47.

[527] Mikulskienė, B., Coronkutė, E., E-health service user portrait in Lithuania. Health policy and management. Research papers. 2014 1(7), p. 31-47.

39 year-olds made from 22.6 per cent to 24.0 per cent of such individuals, the group of 40 to 49 year-olds made from 15.4 per cent to 25.3 per cent, that of 50 to 59 year-olds made from 14.4 per cent to 20.0 per cent, that of 60 to 69 year-olds made from 6.6 per cent to 9.7 per cent, and 70 year-olds and older – from 1.1 per cent to 4.0 per cent."[528]

Also, awareness of e-health services ($p \leq 0.001$) and the use of them (depending on the service, $p = 0.001$; $p = 0.015$; $p = 0.012$) depends on the level of education of the population. The higher the education, the more the individuals know about e-health services and use them. The services are known for 49.5 per cent to 79.1 per cent of individuals with higher education, for 12.0 per cent to 33.1 per cent of individuals with incomplete secondary education. The services are used by 51.6 per cent to 57.5 per cent of individuals with higher education, by 40.2 per cent to 42.7 per cent with secondary (special) and post-secondary education, by 18.8 per cent ($N = 3$) to 53.3 per cent ($N = 8$) with incomplete secondary education.[529]

A correlation between employment and awareness of e-health services has been found. Individuals that differ by employment differ in terms of awareness of e-health ($p \leq 0.001$) and in using them ($p \leq 0.001$). Retirement age or disabled individuals (from 23.5 per cent to 51.6 per cent) are aware of the services to the least extent. The share of the unemployed aware of e-health services ranges from 28.7 per cent to 57.4 per cent. Awareness of e-health services is the highest among schoolchildren and students (from 33.8 per cent to 78.5 per cent), workers and specialists (from 39.5 per cent to 74.9 per cent), businessmen and executives (from 44.4 per cent to 74.4 per cent). Retirement age or disabled individuals use e-health services to the lowest extent (from 16.9 per cent to 29.1 per cent). The share of the unemployed using the services is from 50.6 per cent to 60.0 per cent. The share of schoolchildren and students using e-health services ranges from 27.3 per cent to 66.7 per cent, that of workers and specialists – from 46.4 per cent to 53.4 per cent, that of businessmen and executives – from 39.2 per cent to 55.0 per cent. A strange trend has been observed that a fairly large part of the unemployed are aware of e-health services and use them. It has been found, however, that the major part of the surveyed unemployed aware of

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[528] *Ibid.*

[529] *Ibid.*

e-health services were young people, the largest group being 18-39 year-olds (from 52.8 per cent to 55.0 per cent). Also, the majority of individuals within this group had special secondary or post-secondary education (from 37.8 per cent to 61.5 per cent) and higher education (from 29.5 per cent to 57.1 per cent) and lived in big cities (from 43.4 per cent to 53.8 per cent). Also, the majority of the surveyed unemployed who use e-health services were young people, the largest group being 18-29 year-olds (from 34.5 per cent to 45.8 per cent). The majority of the unemployed who use e-health services had special secondary or post-secondary education (from 44.4 per cent to 72.4 per cent) and higher education (from 24.1 per cent to 48.0 per cent) and were residents of big cities (from 42.9 per cent to 69.6 per cent).[530]

"Awareness of e-health services also depends on the family status of individuals (depending on the service, $p \leq 0.001$; $p = 0.005$). The respondents living in marriage are aware of e-health services from 38.2 per cent to 70.2 per cent, single ones – from 38.9 per cent to 69.9 per cent, those living in unregistered marriage – from 35.8 per cent to 67.6 per cent, divorced – from 31.9 per cent to 62.1 per cent, widowers and widows – from 19.8 per cent to 46.3 per cent. However, the extent of using e-health services in these cases does not always depend on the family status. It has been found that out of the three analysed services only one e-health service (online patient registration – booking for an appointment) depends on the family status ($p = 0.007$). This service is used by 53.0 per cent of the respondents who are single, 47.0 per cent – living in marriage, 39.7 per cent – divorced, 31.1 per cent – living in unregistered marriage, and 30.4 per cent – widowed. Probably, people in families share information about healthcare services, and it is important to take this into account in the innovations implementation process."[531]

Awareness of e-health services depends on the size of a respondent's family, i.e. on the number of children up to 17 years of age living in the respondent's household. This is relevant in the process of e-health system implementation. Children can teach their parents to use e-health services as they are more acceptable to young age. This is demonstrated by the fact

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[530] Mikulskienė, B., Coronkutė, E., E-health service user portrait in Lithuania. *Health policy and management. Research papers.* 2014 1(7), p. 31-47.

[531] *Ibid.*

that respondents with larger families are better aware of e-health services that the ones with smaller families (depending on the service, $p = 0.003$; $p \leq 0.001$). People from households without children up to 17 years of age are aware of e-health services from 32.5 per cent to 63.7 per cent, those from households with one child up to 17 years of age – from 41.8 per cent to 71.3 per cent, two children – from 39.6 per cent to 71.7 per cent and those with 3 and more children – from 38.9 per cent to 77.8 per cent. However, the extent of using e-health services does not always depend on the size of a family. Our analysis has shown that out of the three analysed services only one e-health service (online patient booking for an appointment) depends on the size of a family ($p \leq 0.001$). This service is mainly used by people from households with one or more children up to 17 years of age. E-health service is used by 40.2 per cent of the population of households without children up to 17 years of age, 58.3 per cent – from households with one child up to 17 years of age, 53.9 per cent – from households with two children up to 17 years of age and 30.8 per cent – from households with 3 and more children up to 17 years of age.

"Awareness of e-health services depends on the amount of income of the population, i.e. on the amount of monthly income per family member. Awareness of services is higher among the population with higher income compared to that with lower income (depending on the service, $p = 0.001$; $p = 0.030$; $p \leq 0.001$). The share of the population aware of e-health services whose monthly income per family member is LTL 400 ranges from 34.7 per cent to 60.3 per cent. The share of the population whose monthly income per family member is from LTL 401 to LTL 600 ranges from 30.9 per cent to 64.0 per cent, LTL 601 – LTL 800 – from 25.9 per cent to 55.1 per cent, LTL 801 – LTL 1000 – from 38.3 per cent to 64.2 per cent, and LTL 1001 and more – from 40.1 per cent to 77.5 per cent. However, the use of e-health services does not always depend on the amount of income. It has been found that out of the three analysed services only one e-health service (online sick leave filling in by the treating physician) depends on the amount of income ($p = 0.026$), this service is more often used by the population with higher income. E-health service is used by 42.6 per cent of the population whose monthly income per family member is up to LTL 400; 49.2 per cent – from LTL 401 to LTL 600; 32.8 per cent – from LTL

601 to LTL 800; 35.9 per cent – from LTL 801 to LTL 1000 and 61.0 per cent – LTL 1001 and more."[532]

"Awareness of e-health services (depending on the service, $p = 0.010$; $p = 0.006$; $p = 0.012$) and the extent of using them (depending on the service, $p \leq 0.001$; $p = 0.002$; $p = 0.001$) depends on the frequency of using healthcare services. The population who are frequent users of e-health services are better aware of them and use them to a wider extent than those who seldom use healthcare services. Among the respondents who practically do not use healthcare services (i.e. within 2 recent years they did not use them or used only once) the share of those who are aware of e-health services is from 30.8 per cent to 62.1 per cent, the share of those who use them 2 to 5 times is from 40.2 per cent to 70.9 per cent, the share of those who use them 6 times or more is from 36.4 per cent to 66.6 per cent. Respectively, the share of e-health users is from 9.7 per cent to 17.8 per cent out of the population who within two recent years have practically not used healthcare services, the share of e-health service users out of those who used services 2 to 5 times is from 22.0 pp to 39.1 per cent, 6 times and more – from 19.5 pp to 32.2 per cent.

The population's awareness of e-health services (depending on the service, $p = 0.207$; $p = 0.122$; $p = 0.880$) and the extent of using them (depending on the service, $p = 0.948$; $p = 0.810$; $p = 0.730$) does not depend on which type of healthcare institutions (HCI) – public or private – are more frequently visited by the population. From 32.2 per cent to 64.5 per cent of the population, who visit private HCI more frequently, are aware of e-health services, and the share of those who use them is from 46.7 per cent to 48.6 per cent. From 38.0 per cent to 69.0 per of the population, who visit public HCI more frequently, are aware of e-health services, and the share of those who use them is from 46.3 per cent to 49.6 per cent."[533]

Generally people learn about e-health services from their family doctor, on the Internet, from friends, acquaintances, colleagues.

Users of e-health services indicate that they use them for convince, for time-saving purposes. In most cases, the following interferences in

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[532] Mikulskienė, B., Coronkutė, E., E-health service user portrait in Lithuania. *Health policy and management. Research papers.* 2014 1(7), p. 31-47.

[533] *Ibid.*

using e-health services were indicated: the inability to use them, having no computer, being unaware of such services. Said interferences are more characteristic of elderly people, without formal education, rural population.

Half of the population cannot assess the spectrum of e-health services in Lithuania, and among those who gave an assessment, the larger part were positive assessors. Separate aspects of services were also assessed as positive rather than negative.

Nearly half of the population maintain that their medical institution provides e-health services, and nearly half are not aware of it. Also, the majority could not assess the e-health services provided by their HCI. Among those who assessed the services, the share of positive estimates was higher, and separate aspects of the services were assessed as positive rather than negative.

Those who negatively assess e-health services of their healthcare institution, usually indicate that either these services are too few or there none.

The absolute majority – 96 per cent – of the respondents indicated that no one has asked them about e-health services at their medical institution (**Figure 4.14**).

"Did someone ask you to provide an opinion on e-health services in your healthcare institution?" in per cent

Figure 4.14. Were you asked to provide an opinion, in per cent

This means that the level of involvement of the population in the development of e-health system is very low.

Most often, an open question as to what kind of e-health services the medical institution lacks the most, the answer was that there is a general lack of information about e-health services offered.

The survey carried out at the current level of e-health development in Lithuania has revealed the type of the population that use e-health services most frequently. An individual that uses the most frequently used e-health service, i.e. online registration- booking for an appointment, might be characterised, according to the survey data, as follows (**Table 4.2**):

Table 4.2. Profile of a user of the most frequent e-health service

- Young urban resident of 18–29 years of age;
- Single, living in a household with one child (up to 17 y.o.);
- University student or graduate of a higher education institution
- Has visited HCI infrequently, from 2 to 5 times

However, a statistical Lithuanian resident that generally frequently uses healthcare services is characterised in a completely different way (see **Table 4.3**):

Table 4.3. Description of a resident who is a frequent user of healthcare services

- Female urban resident;
- Elderly, of 60 y., or more, retired or disabled;
- Has (special) secondary or higher education;
- Married, living in a household without children (up to 17 y.o.);
- One family member has the average income of LTL 601 to LTL 1000;
- Frequent visitor of state HCI.

Source: Mikulskienė, B., Coronkutė, E., Portrait of the user of e-health services in Lithuania. *Health policy and management. Research papers.* 2014 1(7), p.p. 31–47

Accordingly, a conclusion may be drawn that e-health services in Lithuania do not satisfy a statistical Lithuanian resident, all the more so a frequent user of healthcare services.

4.4. Summary

"A positive trend has been observed, as compared to the analysis carried out by the Ministry of Health of the Republic of Lithuania in 2011, where only a fourth of the surveyed institutions had e-health systems installed[534]. At present, 67 per cent of specialists of healthcare institutions uses e-health information systems every day. Such a rapid development shows that this particular strategic health policy trend brings results.

According to the data of our surveys, the trends of further e-health development are real and positive: two-thirds of executives of healthcare institutions have envisaged e-health development in the strategic plans for the development of their institutions, a third of them know all e-health modules. This allows supposing that the present health management innovation will be developed in future. At the same time, however, large territorial disparities are observed in e-health implementation. E-health services are provided mainly in Vilnius and in big cities, whereas their extent in villages and small private healthcare institutions is the lowest. Disparities also reflect the fact that about a third of healthcare sector employees still have difficulties in understanding separate elements of providing e-health services.

The vast majority of the population have in their life experience already used – in one way or another and in different scope – some (albeit a small number) of the already implemented e-health services. The share of those who do not use them at all is small – a mere 17 per cent. A third of the population have already used separate e-health modules within two recent years. This suggests that it is acceptable enough for the population. However, the extent of using of separate modules is also highly uneven. City dwellers use them more often compared to rural residents. The population use e-health services considerably more rarely than they know about them. Even the most popular e-health service – online registration- booking for an appointment – which is known to 66 per cent of the population, is used only by nearly half of the respondents. On the one hand, the interest of the population in this innovation and awareness about it gives some optimism, on the other, the difference between the scope of awareness and usage indicates that more intensive management interventions are necessary for reducing the gap by more rapid investment in the implementation of e-health and its spread throughout the country, not only in cities.

A more in-depth analysis of the scope of e-health has revealed that "e-health modules or technological solutions implemented in Lithuania

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[534] MoH of the Republic of Lithuania Final report on implementation of national e-health system, Vilnius, 2011, p. 118.

that healthcare system employees know the best are as follows: online patient registration, sick leave fill-in, patient insurance status and registration e-tracking, statistical outpatient accounting form online fill-in (current 025/a-LK-form). Another eleven e-health technological solutions are known to a third and more medical specialists. The most frequently provided e-health services are as follows: sick leave fill-in, patient insurance status and registration e-tracking, statistical outpatient accounting form online fill-in (current 025/a-LK-form). It is namely these e-health technologies that the surveyed specialists mostly use.

However, there is a small part of healthcare specialists who are of the opinion that Lithuania has a sufficient range of e-health information systems. Most frequently, executives, specialists, and the population indicated three types of services that they lack most of all: electronic prescribing, electronic health record and online patient registration. It is namely for the launch of these modules that the recent national e-health projects are devoted to. It shows that the e-health system is developed in the right direction.

As regards the e-health implementation process, the majority of specialists and executives indicated that within about a five-year period their healthcare institution had launched some new e-health information systems and stressed their advantages. However, the share of medical staff who negatively assess the very process of implementation and its scope is considerably higher than that of positive assessors. It can be a natural result of natural resistance to innovations arising out of ignorance. By the way, this confirms that the level of interest of the medical staff in e-health is still rather low. From a third to half of specialists could not answer the questions as they did not know how to assess them as in their work they had not encountered with some of e-health modules. A small share of specialists expressed critical comments: e-health systems reduce the tempo of work, the information accumulated must often be duplicated, i.e. accumulated both in a hard-copy and electronic format, and the workload has increased.

However, positive assessments of the very process of implementation can be seen in the responses stating that where e-health systems have already been implemented, the majority (three-quarters) of the surveyed specialists are satisfied with the implemented systems, it is indicated that they are convenient to use, more accurate information is accumulated, work may done considerably faster, the organisation of work has improved, and there has been a decrease in the volume of hard-copy documents. This conclusion is also supported by the fact that even if the institutions with an e-health system that functions on a wider scale have a positive attitude towards the very fact of implementing e-health information technologies, most of the respondents could not assess other managerial activities (financing, planning, designing, information dissemination, etc.) related to the operation of such technologies.

One of the main reasons why the users are little informed and use e-health systems to a low extent is not only accessibility to the e-health system, but also the involvement of the interested parties into the decision-making process. Only 2.6 per cent of the population and 7 per cent of the medical staff are involved in the development of services to achieve that they would be acceptable to their users. Only 2 per cent of the population using e-health services have submitted proposals at their own initiative on e-health improvement. Therefore, this area seems to be the one that needs correcting most of all.

Most often, decisions on e-health technologies are taken by the head of an institution. When taking such decisions, in most cases the national e-health strategy and the action plan, as well as advice from relevant responsible state institutions (e.g., MoH), are taken into account. Only a half of the surveyed medical staff indicated that their executives have discussed with them /presented the impact of e-health information system solutions and their place in organising work in a particular healthcare institution. Most often they learn about it only after a technological e-health solution has been implemented or after a specific product has been chosen and presented to the staff or during arranged staff training on how to use one or another new e-health technological solution, and only every fifth medical personnel member learns about it in the process of determining the healthcare institution's needs in terms of e-health information systems/technological solutions and priorities in the development of their healthcare institution. In many cases, the staff do not know whether their healthcare institution has a strategic action plan which includes installation of e-health modules nearest term. Most often they learn about systems envisaged to be implemented at staff meetings of a healthcare institution. The majority of the staff do not know who, in particular, is implementing the new e-health information systems or what type of e-health modules will be installed at their institution nearest term. Only a fifth of specialists indicated that they had been asked about the installation of new particular modules at their institution. The share of those who provided proposals as to what kind of modules should be installed in future was still smaller. A half of the latter indicated that their proposals had been taken into account. A fourth of the staff indicated that are aware that their healthcare institution has approved regulations for healthcare institutions' information systems security. Two-thirds are not aware of it at all. A still larger share is represented by those who are not aware of the main healthcare institution's information system specification, installation guide, user instructions, incident registration and management procedure, register of changes, documents regulating data security regulations or activity continuity management plan.

There is also quite a number of specific problems and barriers indicated in e-health implementation. While the respondents who negatively assess e-health systems, for the most part, indicate that the services are too few or that they do not exist at all and that they generally lack information about e-health services offered, doctors indicate that often it is rather the processes related to the implementation and not so much the very e-health solution or its implementation that is negatively assessed. Besides a lack of financing (only a third of the surveyed institutions had obtained financing from the EU structural funds) and human resources (particularly in case of small and rural healthcare institutions), problems related to the management of innovations implementation processes have clearly come into light, e.g. employee resistance to changes – certain employee groups (particularly older-age employees) avoidance to use the system installed. Another aspect that has influenced a negative attitude is a lack of communication with IT companies or miscommunication resulting in the installed e-health information system that does not answer the needs of its users. There is an obvious problem of human resources. More than half of healthcare institution executives indicated that their health care institution has no special healthcare institution IT unit. In the capital city, only a fifth of healthcare institutions has no IT unit. An obvious problem is compatibility of e-health information systems or e-health technological solutions already installed with external healthcare institutions/information systems of other institutions/ ability to exchange data electronically. Between the main challenges in the implementation of e-health solutions in healthcare institutions indicated by the executives was adapting the systems to the needs of the institution, lack of funds, convincing the staff to use the installed technological e-health solutions, lack of understanding which standards of following. A more in-depth and more detailed analysis of said problems has been continued in further qualitative studies.

Quantitative study data show that to increase satisfaction with e-health development it is necessary to overcome one of the main obstacles – to stress the importance of the stakeholders' role in the development and in the implementation of the national e-health system. E-health services in Lithuania do not satisfy a statistical Lithuanian resident and all the more so – a frequent user of healthcare services. There are large territorial, social and economic disparities in using e-health services. It is namely the involvement of stakeholders, which is – according to the study data – an obviously non-existent process in healthcare institutions, that determines dissatisfaction and fundamental development errors. There are just a few healthcare institutions that perform not only analysis of their staff opinion and needs regarding information systems, but also surveys of their patient opinions and needs.

It may be reasonably maintained that the success of the e-health development process does not proportionately increase as a result of the mere implementation of e-health information systems or new technological e-health solutions. It is a process with a tight dependency relationship to various stakeholder groups and depends on the efforts taken by a healthcare institution itself"[535].

Proposals regarding ways to improve the process are provided by the authors at the end of the present monograph.

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[535] Jankauskienė D., Rotomskienė R., Tamošiūnaitė R., Stokaitė V.,Mačiulienė M. Scope and trends of engagement of healthcare professionals and the population in e-health in Lithuania. Scientific Research. Vilnius: Mykolas Romeris University, 2014. p. 13-16.

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5. QUALITATIVE ANALYSIS:
roles of eHealth participants and problems

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The development of the e-health system as the innovation in the health system management is accompanied by obstacles conditioned by the human factor. The lack of cooperation among the participants of the e-health system[536], different understanding of the system and troubles in the exchange of information[537], resistance to innovation[538] and other human-induced factors are identified in the scientific literature as ones of the most significant barriers to an efficient e-health system's development. According to the assumptions of the subjective theory[539], various research specialists have different knowledge and experience regarding the object of the study. Therefore, in order to evaluate and/or predict further process of e-health development, it is appropriate to examine specific characteristics of the involvement of various parties interested in e-health into the processes of the design and installation of IT systems, their attitude to e-health elements, and satisfaction of the stakeholders with participation in the above processes and with their results.

A qualitative research was conducted using a semi-structured interview method in order to diagnose the content of participation of the stakeholders in the process of e-health design and deployment, attitude of the participants toward own role and roles of other e-health system and e-health system's problems in various stages and aspects of its design and deploy-

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[536] King, G.; O'Donnell, C.; Boddy, D.; Smith, F.; Heaney, D.; Mair, F. S. (2012). Boundaries and e-health implementation in health and social care. *BMC Medical Informatics and Decision Making.* 12 (100): 1–11.

[537] *Ibid.*

[538] Jasulaitis, A.; Plenta, J.; Justickis, V.; Plentienė, J. (2012). Reasons of medical staff resistance against innovations. *Health policy and management.* 1(4): 272–295.

[539] Flick, U. (2006). *An Introduction to Qualitative Research*. London: SAGE Publications, p. 155.

ment. For the above purpose and in order to get more knowledge about the tendencies in e-health development as well as about content and extent of the problem, an original survey instrument was prepared based on theoretical model of e-health components. This instrument consists of the following sets of questions: the most important elements of e-health and their influence on the development of the system; degree of involvement and cooperation between e-health system's participants; value and impact of legal regulation on efficiency and results of the system's creation; the roles of the stakeholders in different e-health development processes; most common problems arising in this area and/or problems with the greatest impact.

5.1. Research methods

5.1.1. The model of the data collection and analysis of the qualitative research

The qualitative data analysis model is designed in accordance with the structured e-health evaluation scheme proposed by Dansky and co-authors[540], which is based on four elements: design and methodology for e-health, technology, environment and logistics. The role of the stakeholders is integrated into the fourth element (logistics). More information on the scheme proposed by Dansky and co-authors is available in **Chapter 6.**

To develop the qualitative data analysis model, e-health evaluation scheme has been changed by separating the management of technological solutions from the content of integration and involvement of the stakeholders and by highlighting the subjective assessment of e-health value. This model is shown in **Figure 5.1** below. It consists of three parts under study: the process of e-health system's design and deployment; the role of the stakeholders in e-health processes; perception of e-health. Although research tasks of each part of the model are unique, the study presents a unique triangulation opportunity where the involvement of the stakeholders (communication, their role, and potential benefits) is in the focus in parallel in different context.

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[540] Dansky, K. H., Thompson, D., Sanner, T. (2006). A framework for evaluating eHealth research. *Evaluation and Program Planning*, 29(4): 397–404.

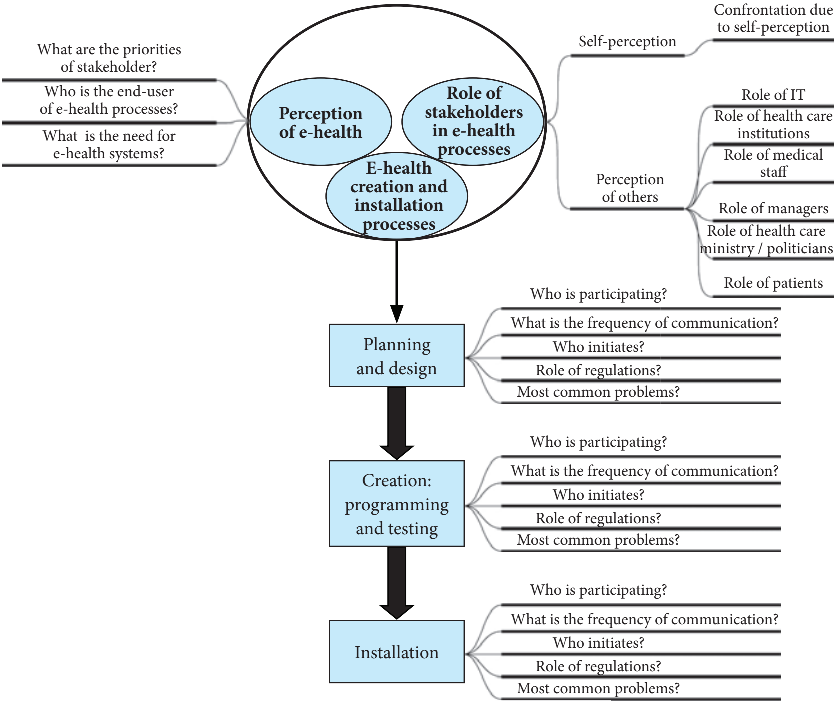

Figure 5.1. The model of the research data collection and analysis of the management of the e-health system development

The following is an individual description of each part of the model.

1. The process of e-health design and deployment.

Task of the research is to reconstruct the e-health system management cycle to find out the particularities of each management cycle and the impact of technological elements of e-health system's development on the involvement of the stakeholders.

To reconstruct the management cycle the data on the planning and design phase, the design (programming and testing) and installation phases are collected.

The data on the roles of the stakeholders required for triangulation are collected using additional questions. These are used for a parallel collection of data on management cycles and their relationship to technological solutions in e-health, on problems in e-health development at each management cycle and on participants who are most active during each management cycle. Particular attention is given to the issues voiced by the stakeholders that can be both directly expressed as a response to a question and indirectly expressed by means of a discussion of other elements of e-health.

The relation between management cycles and questions under study are provided in **Table 5.1**.

Table 5.1. Connection between the management cycle and the questions under study

Management cycle	Questions under study
Planning and designing	Who is participating? What is the frequency of cooperation? Who is initiating? What is the role of legal regulation? What are the most frequent problems?
Creation (programming and testing)	
Installation	

Source: prepared by authors.

2. Role of the stakeholders in e-health processes

Tasks of the research are to reconstruct management roles of the stakeholders, which they tend to take on during e-health development processes or which they split according to predefined management rules.

Two types of data are required to examine the roles of the stakeholders. Some data are on how specific party sees itself and its role in e-health processes. Other data concern how a specific party or a group of parties saw other participants of the development of e-health system. The combination of the above types of data, even when they possibly confront each other, may reveal the true roles of the stakeholders. To achieve the task of the research the following research analysis questions were prepared:

- perception of own role;
- perception of the role of others (role of IT companies, role of healthcare institutions, role of doctors/nurses, role of managers, role of politicians/officials of the Ministry, role of patients).

3. Perception of e-health

Task of the research is to highlight the acceptability of e-health models, already operating and new created, conditioned by the stages of e-health development and the subjective perception of e-health characters.

Analysis of this task examines the priorities subjectively perceived and the added value of e-health subjectively assessed by the stakeholders and (the questions raised about the final e-health consumer, needs for e-health systems?). This task also explains other parts of the qualitative analysis model.

5.1.2. Design of the research instrument

A qualitative study based on the assumption of the theory, known as the subjective theory, stating that various research specialists have different knowledge and experience regarding the object of study[541]. This experience is identified by the use of semi-structured interview method. The chosen method allows understanding a broader context of the object of study and allows a more flexible interpretation of participation of the stakeholders in the processes of e-health creation and deployment.

Qualitative research strategy and research instrument is formed so as to allow the diagnosis of the content of participation of the stakeholders in the e-health design and deployment process and provide the cause and effect context for the analysis of e-health elements.

A uniform questionnaire for all groups of respondents is formed according to the qualitative research analysis model (**Table 5.2**). Although the research model is quite complex and has a lot of parallel research structures, a simple questionnaire survey was successfully constructed to collect qualitative information and reflect the key research tasks. The questionnaire consists of 7 groups of questions.

Groups of questions of semi-structured interview:

1. Demographic information is the institution represented by the respondent, his or her position and relationship with e-health. This information is required to determine the concerned groups and assign the dominant opinion to them.

2. eHealth elements

This group of questions is designed to define e-health management cycle by linking to the content of architecture, design, applied technologies,

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[541] Flick, U. (2006). *An Introduction to Qualitative Research*. London: SAGE Publications, p. 155.

security and privacy, cooperation, design, deployment, processes of use of e-health modules. The subjective opinion on interests of groups of the stakeholders and the worst of the problems we face at each development phase are also asked for.

3. eHealth elements – cooperation and degree of involvement

This group of questions is designed to find out who is involved in the development of e-health system, what kind of participation this is, why certain groups of concerned parties are participating. Questions are formulated so as to be able to explore both the role of the respondent's institution and the role of the institutions or companies he or she knows. It is attempted to grasp the depth of participation through questions about the intensity and passivity of participation.

4. Added value of legal regulation

This group of questions is designed to understand the contribution of public administration in the development of eHealth, thus the questions ask about budget, priorities of reallocation of funds, strategic decision-making, models of responsibility and control. It is also attempted to reach information on attitude toward the centralised management of e-health.

5. *Role of the stakeholders in e-health processes*

This group of questions asks the respondents to name their perceived roles in the success of e-health projects. These responses are presented prior to the second and third group questions.

6. *The most common problems*

This question provides respondents with an opportunity to concentrate on maladies their notice provided those have not been mentioned in other questions before.

Table 5.2. Diagnostic blocks and content of the questionnaire

Diagnostic block	Content of questions
eHealth elements	Respondent's attitude toward e-health elements in Lithuania and in the represented institutions. Opinion on the processes of architecture, design, technologies, privacy and security, cooperation, design, deployment, and use. Assessment of the element which creates most of the problems in installation/design/operation. Opinion on the attitude of other stakeholders (e.g., doctors/medical institutions, company's programmers, civil servants) toward e-health elements.
eHealth element: cooperation	Frequency and content of introduction to e-health innovation. Sources of information on e-health. Involvement of the respondent at separate stages of the process of e-health design and deployment. Attitude toward the necessity of involvement of various stakeholders in separate stages of the process of e-health design and deployment. Object and nature of cooperation in dealing with problems arising. Assessment of activity/inactivity of other stakeholders in the design and deployment of e-health. Selection and nature of cooperation of IS installers.IS errors correction practice.
Regulation	Assessment of e-health priorities, budgets, timelines. Assessment of e-health policy formulation and control model. Planning of e-health strategy implementation in the represented institutions. Assessment of e-health legal regulation. Practical experience in legal regulation. Attitude toward the processing of personal data in cyberspace (data security, storage, portability).
Role	Role and influence of the Ministry of Health in terms of the success of e-health projects. The role of the respondent's institution in e-health system's integrity. The role of the IT company (installer) in the success of e-health projects.
Problems	Reasons for obstacles in e-health deployment. Changes that could lead to a smoother e-health development.

Source: prepared by authors.

Although it is a relatively free form of an interview, a sufficiently strictly limited duration of the interview is scheduled to save respondents' time.

The questionnaire is formed for an interview 30 to 60 min long depending on the respondent's position and/or connection with e-health processes.

5.1.3. Selection of respondents and interviewing

List of respondents is made using the results of the analysis of the sources that provide information on institutions involved in e-health process. We can distinguish the following levels of selection of potential respondents:

- Selection according to data of legislation governing e-health system's design. The selection is used to identify the types of institutions involved in this process (state-level bodies performing the control of the e-health policy formation and implementation; healthcare institution that installs internal e-health information systems and/or e-health information systems associated with other institutions; organisations creating and installing e-health IS).
- Selection according to an analysis of e-health projects already implemented and/or in progress. In order to obtain data on healthcare institutions that have installed (are installing) e-health IS, data were collected (project participants, goals, funds, deadlines) on the projects funded (being funded) by the EU and/or public funds. Data on the organisations that participated and/or won public procurement tenders for e-health IS design and deployment organised for the implementation of these projects were collected. Results of this analysis provided information on healthcare institutions that most actively and not so actively operate in e-health development area and their connections with other healthcare institutions in the implementation of joint projects.
  - As the e-health system covers the whole territory of the country and different levels (from institutional to national) and its design and deployment involves people of different positions, it is necessary to ensure geographical distribution and diversity of representation of institutions and positions occupied. Therefore, for the purpose of qualitative study of e-health system elements potential respondents were selected from all possible participants according to certain cues to ensure a rational variety of possible respondents;

- The need to compare achievements of healthcare institutions in large and smaller cities in e-health area and attitude of employees toward the similarities and differences in e-health. Health system institutions in 10 cities were selected by means of interview (Vilnius, Kaunas, Klaipėda, Šiauliai, Panevėžys, Tauragė, Utena, Kupiškis, Rokiškis, Pasvalys);
- The aim was to ensure that the respondents are from institutions performing different functions in e-health system (policy-makers and implementation control authorities, authorities designing and installing e-health solutions, IT and/or consulting services organisations). Therefore, interviews were conducted with 8 types of organisations (hospitals, out-patient clinics, primary healthcare centres, clinics, clinics department (clinic hospitals), ministries, authorities subordinate to the ministry, IT companies);
- The aim was to interview representatives of healthcare institutions that are both the most advanced in e-health area and have implemented e-health solutions the less. Therefore, the selected respondents are from such leading institutions (by the number of implemented e-health projects/ e-health projects in progress) as Central Polyclinic in Vilnius, Vilnius University Hospital Santariškių Clinics and regional healthcare institutions that have installed only centralised IS;
- The relation of employees occupying different positions with the e-health system is examined. Interviews conducted with the respondents that occupy various positions (chief doctors in hospitals, chief doctors' assistants, managers of polyclinics, their advisers, doctors, nurses, IT specialists in healthcare institutions, managers in IT department of healthcare institutions, managers and employees in IT companies, heads of departments in the Ministry and others).

In order to get open answers to the interview questions as possible, the anonymity of the respondents is ensured. Therefore, respondents were given a unique code. The code is formed so as to enable the identification of the institution represented by the respondent and his or her position. Institutions represented by the respondents are divided into 5 groups (polyclinics or primary healthcare centres, clinics and hospitals, state regulation institutions, IT and consulting companies, and private healthcare institutions). Positions of the respondents are divided into 6 groups (administrative staff in healthcare institutions, doctors and nurses, IT department managers and employees in healthcare institutions, civil servants, e-health project managers and coordinators in healthcare institutions and IT companies, managers in IT and consulting companies). **Table 5.3** provides the general list of interview respondents, geographic areas and types of institutions they represent and current positions of the respondents.

Table 5.3. The consolidated list of interview respondents

Item No.	Respondent's code	Town	Type of the healthcare institution	Respondent's position
1.	1-P-A	Šiauliai	Clinics	Director
2.	2-P-IT	Šiauliai	Clinics	IT specialist
3.	3-L-A	Šiauliai	Hospital	Deputy senior doctor
4.	4-L-IT	Šiauliai	Hospital	IT specialist
5.	5-P-A	Panevėžys	Clinics	Director
6.	6-P-IT	Panevėžys	Clinics	IT specialist
7.	7-P-M	Panevėžys	Clinics	Doctor
8.	8-L-A	Panevėžys	Hospital	Deputy senior doctor
9.	9-L-IT	Panevėžys	Hospital	IT unit head
10.	10-L-M	Panevėžys	Hospital	Doctor
11.	11-P-A	Pasvalys	Clinics	Director
12.	12-L-A	Pasvalys	Hospital	Senior Doctor
13.	13-L-A	Utena	Hospital	Deputy senior doctor
14.	14-L-IT	Utena	Hospital	IT specialist
15.	15-P-IT	Utena	Clinics	IT specialist
16.	16-L-A	Rokiškis	Hospital	Senior Doctor
17.	17-L-P	Rokiškis	Hospital	eHealth project manager
18.	18-L-IT	Kupiškis	Hospital	IT specialist

Item No.	Respondent's code	Town	Type of the healthcare institution	Respondent's position
19.	19-L-M	Kupiškis	Hospital	Doctor
20.	20-P-A	Kupiškis	Primary health-care centre	Economist
21.	21-P-P	Kupiškis	Primary health-care centre	eHealth project coordinator
22.	22-P-A	Vilnius	Clinics	Director
23.	23-L-A	Vilnius	Hospital	Deputy senior doctor
24.	24-L-IT	Vilnius	Hospital	IT Department head
25.	25-L-A	Tauragė	Hospital	Deputy senior doctor
26.	26-L-IT	Klaipėda	Hospital 1	IT specialist
27.	27-L-A	Klaipėda	Hospital 2	Deputy senior doctor
28.	28-L-M	Klaipėda	Hospital 2	Doctor
29.	29-L-A	Kaunas	Clinics Hospital	Director
30.	30-L-IT	Vilnius	Clinics	Doctor
31.	31-L-M	Vilnius	Clinics Hospital	IT unit head
32.	32-R-VT	Vilnius	State regulatory institution	Department head
33.	33-Pr-IT	Vilnius	Private Health-care organisation	IT unit head
34.	34-Pr-M	Vilnius	Private Health-care organisation	Doctor
35.	35-Pr-M	Vilnius	Private Health-care organisation	Doctor
36.	36-IT-D	Vilnius	IT company	Director
37.	37-IT-D	Vilnius	IT company	Director
38.	38-IT-P	Vilnius	Consulting/IT company	eHealth project coordinator
39.	39-IT-P	Vilnius	IT company	eHealth project coordinator

Item No.	Respondent's code	Town	Type of the healthcare institution	Respondent's position
40.	40-IT-P	Vilnius	Consulting/IT company	Healthcare Director
41.	41-IT-P	Vilnius	Consulting/IT company	eHealth project coordinator
42.	42-P-A*	Vilnius	Primary healthcare centre	Director/ physician
43.	43-P-M*	Vilnius	Primary healthcare centre	Senior nurse
44.	44-P-A*	Vilnius	Clinics	Director's advisory assistant/ Nurse
45.	45-P-A*	Vilnius	Primary healthcare centre	Senior nursing administrator
46.	46-P-IT*	Vilnius	Clinics	IT specialist
47.	47-P-IT*	Vilnius	Clinics	IT specialist
48.	48-R-VT*	Vilnius	State regulatory institution	Department head
49.	49-R-VT*	Vilnius	State regulatory institution	Senior specialist
50.	50-R-VT*	Vilnius	State regulatory institution	Department head
51.	51-L-A*	Vilnius	Clinics Hospital	Deputy senior doctor
52.	52-L-IT*	Vilnius	Clinics Hospital	IT unit head
53.	53-Pr-A*	Vilnius	Private Healthcare organisation	Deputy director
54.	54-Pr-A*	Vilnius	Private Healthcare organisation	Senior nurse
55.	55-Pr-A*	Vilnius	Private Healthcare organisation	Laboratory chief
56.	56-Pr-A*	Vilnius	Private Healthcare organisation	Auditing agency leader

Item No.	Respondent's code	Town	Type of the healthcare institution	Respondent's position
57.	57-Pr-M*	Vilnius	Private Healthcare organisation	Doctor
58.	58-Pr-M*	Vilnius	Private Healthcare organisation	Nurse
59.	59-Pr-A	Vilnius	Private Healthcare organisation	Director
60.	60-IT-D	Vilnius	IT company	Director

*– respondents of group interview (below).
Source: prepared by authors.

Interviews were conducted at the workplace of each respondent and recorded using a voice recorder. While interviews were conducted according to the questionnaire prepared, when the respondents were answering the questions, when they find it significant or interesting it was allowed to deviate from the conversation plan. When the respondents were deviating from the conversation plan, the conversation was allowed to go as is in order to find out previously unknown details about the processes. Notes and comments were made during interviews as well to allow for better explanation of thoughts that were voiced during the interview. A team of researchers consisting of two individuals has surveyed each respondent. The fact of two, rather than one, researchers has ensured that there are no important questions left unanswered or important details are left without attention.

To adapt to respondent's communication style, the information of interest was collected using various forms of questions[542]. Each interview used combinations of different types of question (introductory questions, monitoring questions, probing, clarifying, direct and indirect questions, structuring, interpretation questions, and non-disclosure).

In addition to individual interviews, three group interviews were organised. Just like the selection of potential respondents for individual inter-

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[542] Kvale, S. (2008). *Doing Interviews*. London: SAGE Publications Ltd., p. 160.

views, participants of group interviews were carefully selected to ensure the diversity of opinions and intensity of discussions. Two groups were formed from healthcare institutions staff to investigate consistency and contradiction of the needs and attitudes toward e-health between healthcare institutions administration, IT employees and doctors and nurses. Therefore, one group interview was held in one of Vilnius outpatient clinics (**Table 5.4**), and the other interview was conducted in one of private healthcare institutions (**Table 5.5**). The third group interview was designed to investigate the inter-institutional cooperation (**Table 5.6**). Therefore, representatives of e-health policy-making institutions, institutions that control its implementation, and institutions implementing e-health projects were invited. Such a group of informants helped in getting information on the involvement of the stakeholders in the development of e-health system on the state level. As representatives of various institutions took part, the group interview was organised in Mykolas Romeris University.

Table 5.4. Respondents of group interview in an outpatient clinic

Item. No.	Code	Type of the healthcare institution	Respondent's position
1.	42-P-A	Primary healthcare centre	Director/ General practitioner
2.	43-P-M	Primary healthcare centre	Senior nurse
3.	44-P-A	Clinics	Director's advisory assistant/ Nurse
4.	45-P-A	Primary healthcare centre	Senior nursing administrator
5.	46-P-IT	Clinics	IT specialist
6.	47-P-IT	Clinics	Computer systems specialist

Source: prepared by authors.

Table 5.5. Respondents of group interview in HI

Item. No.	Code	Type of the healthcare institution	Respondent's position
1.	53-Pr-A	Private Healthcare organisation	Deputy director
2.	54-Pr-A	Private Healthcare organisation	Senior nurse
3.	55-Pr-A	Private Healthcare organisation	Laboratory chief
4.	56-Pr-A	Private Healthcare organisation	Auditing agency leader
5.	57-Pr-M	Private Healthcare organisation	Doctor
6.	58-Pr-M	Private Healthcare organisation	Nurse

Source: prepared by authors.

Table 5.6. Respondents of Mixed Group Interview

Item No.	Code	Healthcare institution type/organisation	Respondent's position
1.	48-R-VT	State regulatory institution	Department head
2.	49-R-VT	State regulatory institution	Senior specialist
3.	50-R-VT	State regulatory institution	Department head
4.	51-L-A	Clinics Hospital	Deputy senior doctor
5.	52-L-IT	Clinics Hospital	IT unit head

Source: prepared by authors.

All group interviews were moderated by the scientist experienced in conducting interviews in the presence of at least one researcher. Duration of such interviews was longer than duration of individual interviews (at least 1 hr 30 min) allowing all the participants to speak and to touch on all the questions of the research. However, time was limited and the discussions were controlled so to avoid getting encumbered by details.

The organisation and conduction of individual and group interviews was done to create an atmosphere of cooperation. For this purpose, the project being implemented, its objectives, and expected results were presented, and the benefits of interviews and the importance of each respondent's contribution to this project were justified. With such climate of cooperation created, the respondents were discussing questions willingly and openly.

5.1.4. Interview data analysis

Unlike the classical (quantitative) analysis, the qualitative content analysis includes qualitative rather than a quantitative accentuation of text aspects[543]. Qualitative analysis is designed to learn from the data collected through its analysis until the understanding of the operation models and structures is achieved. This type of studies mostly focuses on the world's perception of the interview participants. Perception of theory is being developed in several stages for the purpose of a holistic understanding of the participation of a person, group, or culture in the different processes. The analysis is based on segmentation of information in the form of text according to different key aspects. The meaning stated in an open, and direct manner in the text is a manifest content. Analysis of manifest content allows categorising the research data based on the text describing the objects. The meaning understood indirectly, a deeper meaning is a latent (hidden) text content[544]. The interpretive latent content analysis allows interpreting the descriptions and understanding the meaning inherent in the text, seeing the new meanings that can be read between the lines or were not accurately expressed orally. The above analysis helps in distinguishing the themes and sub-themes that have originated in the data as well as meaningful segments. In further analysis, these fragments are connected again according to similar meaningful categories. This makes it possible to evaluate the data from different perspectives and find new insights into the relationships between various factors and their consequences.

In order to facilitate large-scale research data analysis, data coding is performed. The coding is often understood only as data marking according to different themes. However, this process is much more complicated. The coding is mostly based on the creation of the category tree where the meaningful items are assigned to the main categories and subcategories and then used for further analysis. The categories are different themes or perspec-

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[543] Berg, B. L. (2007). *Qualitative Research Methods for the Social Sciences*. Boston: Pearson Education, Inc.

[544] Bitinas, B., Rupšienė, L., Žydžiūnaitė, V. (2008). *Qualitative Research Methodology: textbook for management and administration students. 2nd edition.* Klaipėda: S. Jokuzys Publishing-Printing.

tives crosscutting the text under study, and they become a tool to classify the semantic text units, i.e. words, sentences, and groups of sentences.

The coding begins with reading the interview text and extracting segments. Each segment is marked with a code, which is usually a word or a short phrase indicating how the segment is related to the purposes of the research. When the coding is completed, the researcher may prepare different reports: summarise the prevalence of codes in different segments, discuss the similarities and differences between various codes, sources, contexts and compare the relationship between one or more codes. In coding, a researcher switches from simple analysis to theorisation. For this reason, it is needed to store the data and the most important part of data on the distinguished categories until such data is fully understood. With the information in one place, it makes it easier to evaluate, interpret and get new insights. The coding enables an easier search for similarities, differences, models, and connections. Thus, it is an important part of the analytical process.

Qualitative analysis software has changed the long tradition of hand-coding[545]. In this study, Nvivo and Atlas applications were used for data processing. This software is designed for qualitative data processing and analysis in the social sciences and helps in the analysis of qualitative data in several respects. First of all, these applications facilitate data processing processes and allow systematising the records generated in the course of qualitative study. Computerised qualitative content analysis applications allow processing and organising ideas by creating a quick access to conceptual and theoretical knowledge developed in the process of the study. Nvivo and Atlas also enable researchers to raise questions related to the data collected and to, using the database inside the software, select all the information required for the responses to the questions and for graphic representation of the ideas and correlations from the empirical data using models and matrixes[546]. Nvivo and Atlas applications, the same as other software designed for qualitative content analysis, have methodological limitations. First of all, it should be noted that these programmes are intended to facilitate the research, but the applications themselves cannot independently analyse the

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[545] Richards, L. (2005). *Handling qualitative data: A practical guide*. Thousand Oaks, CA: Sage.

[546] Morkevičius, V., Telešienė, A., Žvaliauskas, G. (2008). *Computerised analysis of qualitative data with NVivo and Text Analysis Suite*. [accessed 12-12-2014]. <http://www.lidata.eu/files/mokymai/NVivo/KKDA_20080914_ esf'ui.pdf>.

text and make conclusions. The applications are valuable for working with large quantities of data, especially in the early stages of analysis focusing on the original text analysis, naming themes in the text and searching for words and themes. Later coding stages associated with data interpretation are heavily influenced by personal traits of the researchers analysing the text. For these reasons, the researcher or group of researchers remains the main tool for this work.

Searching for order, structure and interpretation in the quantity of data collected is an inconvenient and complicated process. For this reason, there is a multitude of different ways to perform the search. Crabtree and Miller[547] offer the continuum reflecting the diversity of analysis strategies but emphasise that there are almost as many strategies as there are researchers. One side of the continuum presents technical, scientific, standardised strategies where the researcher assumes an objective position in regards to the problematic question and categories. The other side presents immersion strategies where categories are not provided for in advance and are subject to the researcher's intuition and interpretation. The strategy used in the context of this study, which is in the core of the continuum, is identified in the literature as template analysis. The analysis process starts with using the predefined categories template, which is in later stages filled in with the contextual data. In this study, the categories template is formed so as to allow the diagnosis of the content of participation of the stakeholders in e-health design and deployment process and to provide e-health element analysis with cause and effect context based on five diagnostic blocks: e-health elements, cooperation, regulation, the role in e-health system, and problems.

The design of the primary template is conditioned by a group of factors such as the concept of the research, question of the research, problem areas and so on. Miles and Huberman [548] point out that the same text segment can be understood as several levels and propose a three-step encoding process for full understanding of the text and its meanings. First, a descriptive process analysis is performed and followed by the problem and comparative

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[547] Crabtree, B. F., & Miller, W. L. (Eds.) (1992). *Doing qualitative research*. Newbury Park, CA: Sage.

[548] Miles, M. B., Huberman, A. M. (1994). *Qualitative Data Analysis.* Second Edition. Sage Publications, London.

analyses. Each stage includes data reduction processes to divide the data quantities into segments and interpretation processes where the researcher gives meaning to the identified segments by integrating them into the general system. The process steps are illustrated in **Table 5.2** and hereinafter explained in more detail in the context of this study.

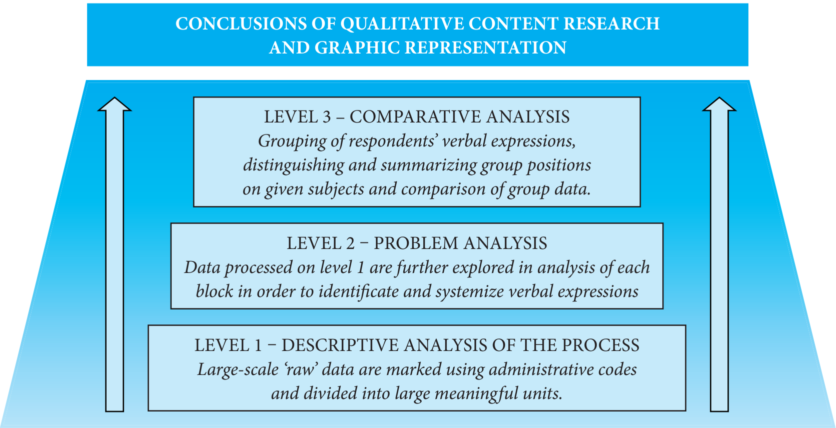

Figure 5.2. Process of qualitative content research

Source: prepared by the authors based on Miles and Huberman[549].

1. Level 1 – Descriptive analysis of the process

As already mentioned, individual and group interviews were conducted with recording statements of the participants using the voice recorder and later transcribing the full interview material. The transcribed material was processed using the software in accordance with the requirements of such software. Processing of the transcribed interview was further performed using the software, i.e. the meaningful analytical units were marked and coded with statements referring to the meaning of the units of analysis. Interview materials were first marked with administrative codes that identify demographic characteristics of the interview participants (a type of healthcare institution, respondent's position, etc.). Later, each interview was read several times in order to determine the essential circumstances and aspects named by the respondent in words. Each respondent's attitude and experi-

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[549] *Ibid.*

ence are analysed according to the data analysis blocks by grouping them into the categories of the interview questionnaire:

- e-health need, attitude toward e-health elements;
- internal and external participation and cooperation of the stakeholders;
- e-health regulation;
- role of authorities of different levels;
- problems in the creation of e-health.

Notes and comments were used during the process for the later use during the following stages of the research. Ideas were generated based on respondents' texts in order to define the overall picture and distinguish important details.

2. Level 2 – Problem analysis

At this stage, all the data are divided into smaller parts to search for similarities and conceptual structures through less emphasis on the ranking and connections. In each of the analysis blocks, statements expressing the critical points in a given block are identified and structured. The codes generated at this stage open up a more detailed data layer as comparison of the data is performed with consideration of the similarities and differences of aspects discussed by the interview participants and emergent themes and categories are identified and distinguished. At the first stage, the coded data are once again reviewed in more detail to find common aspects. This is categorisation or variables oriented part of the analysis[550, 551]. Similar aspects can be recorded to illustrate the newly named concepts or relationships. Previously defined concepts can be re-organised into the aggregate of specific aspects. 181 code themes and categories were identified during the research. Those are illustrated in **Figure 5.3** below.

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[550] Miles, M. B., A. M. Huberman (1994). *Qualitative Data Analysis.* Second Edition. Sage Publications, London.

[551] Bitinas, B., Rupšienė, L., Žydžiūnaitė, V. (2008). *Qualitative Research Methodology: textbook for management and administration students. 2nd edition.* Klaipėda: S.Jokuzys Publishing-Printing.

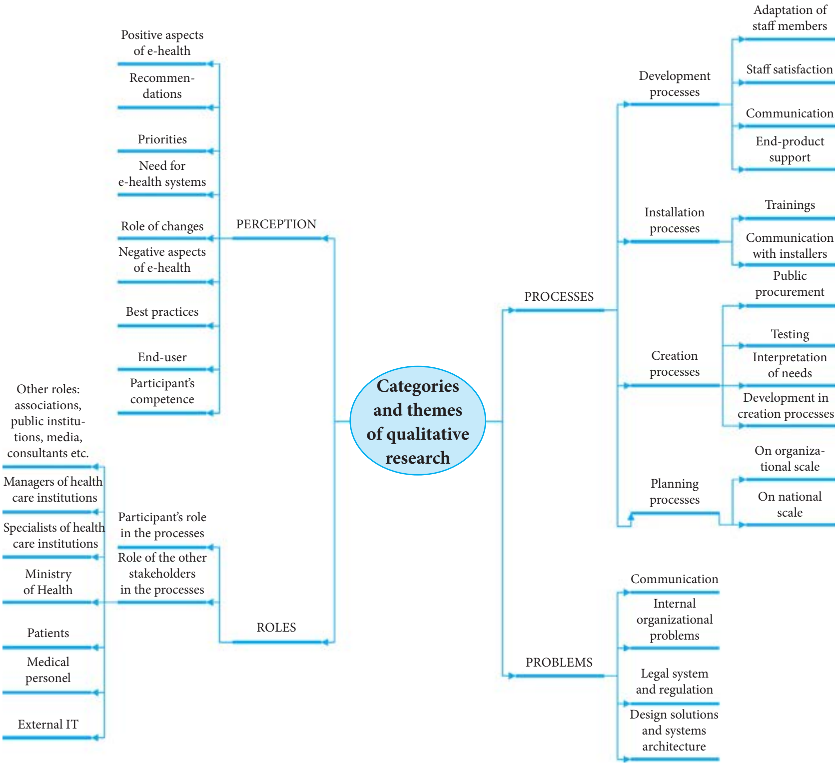

Figure 5.3. Themes and categories of qualitative research

3. Level 3 – comparative analysis.

At this stage, statements of different groups of respondents are grouped; position characteristic to the group on a particular issue is isolated and summarised, and data between different groups is compared. Miles and Huberman[552] have defined this stage of analysis as the process or 'contextual' analysis which aims at determining the sequence and relations between the identified categories. Several additional strategies have been used both for qualitative and interpretative content and for the latter 'contextual' analysis. These are abstraction, deduction, contextualization, and numbering. The researcher considers how themes, concepts, behaviour and processes iden-

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[552] Miles, M. B., A. M. Huberman (1994). *Qualitative Data Analysis.* Second Edition. Sage Publications, London.

tified in the problem and descriptive analyses are related to different data sets. For example, this is done by distinguishing similar features in different categories according to respondents' groups. At this stage, the similarities, differences, conflicts and others are examined in order to distinguish meaningful and illustrative examples to describe data. Similarities and differences of the manifested relation between the variables are highlighted by accentuating extreme and atypical cases and merging and integrating the related cases which are similar in terms of connection content. The research aimed at diagnosing the context of participation of the stakeholders in e-health design and deployment process and providing cause and effect context to the analysis of e-health elements. Comparative analysis (results are provided in later sections of this chapter) allowed finding similarities and differences between opinions voiced by experts of different groups.

5.1.5. Validity of the research

The internal validity of the research is grounded using a number of ways. Pilot interviews were conducted in order to verify how well the survey participants understand the questions, and the terminology used as well as to clarify the sequence of questions. Opinion of the research participants on adequacy of the interpretation of data was identified by means of feedback control of the research participants[553], i.e. 5 individual and group interview participants were contacted during data analysis and asked to identify and interpret the facts and circumstances they had named. In most cases, opinions of the respondents and the authors have concurred. Cross-checking was also performed. The results were reviewed at each stage of the research data analysis by the research project's co-authors. With consideration of differences of opinion that displayed during discussions and for the purpose of objectivity of results, the themes that were described with insufficient clarity were adjusted by supplementing them with textual illustrations and quotes.

Another indicator improves research quality is the external validity which indicates that the research findings can be generalised or attributed to the entire population of the research. Statistical generalisation in qualita-

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[553] Creswell, J. W. (2008). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 3rd edition. London: SAGE Publications, Inc.

tive research is not important. Thus Guba and Lincoln[554] suggest using the concept of transferability instead of the concept of external validity which is more appropriate for quantitative research. One of the strategies for ensuring the transferability of research is rich, thick description of the research[555] [556]. It is defined as a detailed description of the research process with a detailed discussion of the research object, methods and procedures used, and the role of the researcher and other research circumstances. In order to increase the possibilities for research transferability, the research presents a detailed description of research process organisation and realisation. Another indicator of research quality is reliability or dependability. Reliability of qualitative research is increased when stability and repetition of the obtained research data are ensured[557]. Several researchers were involved in categorising data in the research for the purpose of increasing reliability. Also, a partially structured questionnaire with open questions is used to ensure the stability of the obtained data and maximise the research reliability. This increases the sequence of the content of the generated descriptions and similarity of context and situation aspects.

5.2. Roles of e-health participants: perception of own roles or roles of other participants

B. Pitrėnaitė-Žilėnienė, M. Mačiulienė

Efficiency of e-health system's development is determined by the attitudes of the participants toward their own roles and roles of other stakeholders in the installation of information technologies in healthcare institutions. It is, therefore, appropriate to investigate the attitudes of e-health

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[554] Guba, E. G., Lincoln, Y. S. (1994). *Competing paradigms in qualitative research.* In N. K. Denzin & Y. S. Lincoln (Eds.). Handbook of qualitative research, Thousand Oaks, CA: Sage, p. 105–117.

[555] Bitinas, B., Rupšienė, L., Žydžiūnaitė, V. (2008). *Qualitative Research Methodology: textbook for management and administration students. 2nd edition.* Klaipėda: S. Jokuzys Publishing-Printing.

[556] Creswell, J. W. (2008). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 3rd edition. London: SAGE Publications, Inc.

[557] Bitinas, B., Rupšienė, L., Žydžiūnaitė, V. (2008). *Qualitative Research Methodology: textbook for management and administration students. 2nd edition.* Klaipėda: S. Jokuzys Publishing-Printing.

system's participants toward what functions they assume themselves in the design, deployment and development of IS and what kind of operation they expect from other participants.

The analysis of quantitative interview data (the number of times any group of respondents spoke about the roles of different of participants in e-health system) allows for the diagnosis of the roles of e-health participants which are most relevant to the respondents. It should be noted that, generally, the actualisation of roles of any participant indicates the problem in such roles. Consequently, the qualitative data analysis begins with the analysis of quantitative characteristics of the interview.

The interviews revealed that while talking about their own roles and the roles other e-health participants, the respondents rarely differentiate between two major stages of e-health system's creation, unless to emphasise the problematic role of one or another participant at a certain stage. However, the initial analysis of the interviews begins by reviewing a quantitative actualisation of the roles according to two important stages of e-health development. The first stage involves the planning of e-health system's creation and the creation of information systems, and the second stage involves the IS installation and post-installation process, to be called the systems development process. **Figures 5.4 and 5.5** demonstrate how many times a particular group of the respondents spoke about the roles of certain group of e-health participants (colour of the box shows the frequency of, i.e. the darker the box, the more times respondents of a particular group spoke of the roles of a certain group of participants). It should be noted that the frequency of numerical data can be compared only with one group of the respondents, i.e. frequencies cannot be compared between different groups of the respondents. This limitation stems from the fact that sizes of different groups of the respondents are not equal. For instance, the largest group of the respondents is managers of healthcare institutions; thus, the number of quotes on the roles is correspondingly higher than the number of quotes of the respondents from the Ministry of Health and other regulatory authorities.

The analysis of the intensity (frequency) of the respondents' statements about their own roles and the roles of other e-health participants in IS planning and creation processes (**Figure 5.4**) shows that, during the interviews, the role of the Ministry of Health was mentioned most frequently and managers of healthcare institutions were talking about it. The medical staff is the second most relevant role and/or problematic area for managers of healthcare institutions, and external IT companies are the third most relevant for them. Respondents of external IT companies also consider their own role and the role of the Ministry of Health most relevant. Specialists of healthcare institutions focused the most of attention on the roles of IT companies in e-health planning and IS creation processes as well. The medical staff is the second in terms of the frequency of statements. Representatives of the Ministry of Health and other public health authorities, as well as doctors and nurses of healthcare institutions, focused mostly on their own roles during the interviews.

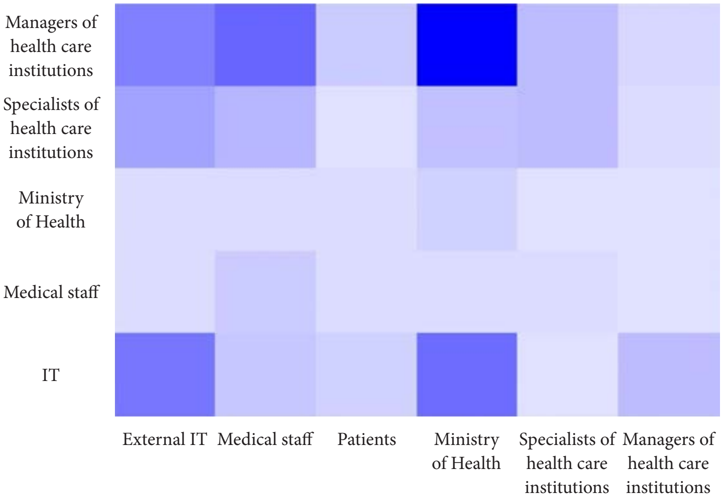

Figure 5.4. Frequency of statements of the respondents about their own roles and the roles of other e-health participants the is planning and creation processes

The analysis of the frequency of the respondents' statements about their own roles and the roles of other e-health participants in IS installation and development processes (**Figure 5.5**) shows that in most cases the roles of medical staff where mentioned and the respondents from the group of managers of healthcare institutions talked about it. Also, the latter respondents found the roles of external IT companies and of the specialists of healthcare institutions subordinate to them in installation and development processes relevant. Specialists of healthcare institutions found the roles of external IT companies and medical staff most relevant in IS installation and development processes (like at the planning and creation stages). Respondents of the Ministry of Health did not talk about the roles of any e-health participants in IS installation and development, whereas medical staff, the same as at the first stage, found their own role most relevant. The respondents representing external IT companies were most frequently mentioning problems in their own functions and going deep into the roles of managers of healthcare institutions when talking about the roles of the participants in e-health in IS installation and development processes during the interviews. They also were mentioning peculiarities of operation of medical staff and the Ministry of Health at these stages.

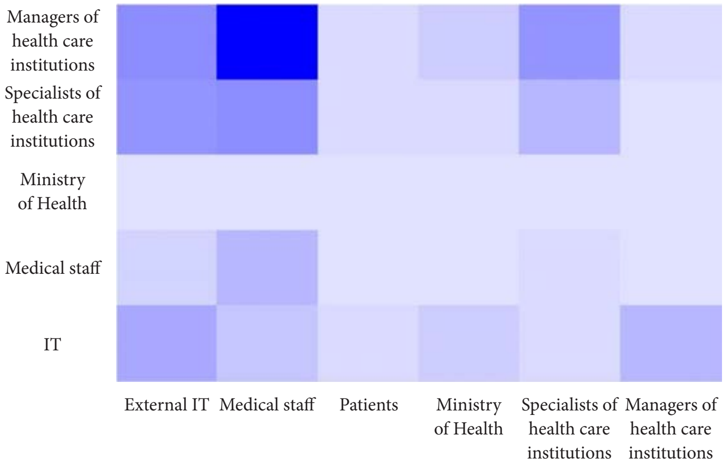

Figure 5.5. Frequency of statements of the respondents about their own roles and the roles of other e-health participants the is installation and development processes

In the process of the qualitative interviews data analysis, the characteristic quotes have been selected so as to diagnose how representatives of each group of e-health participants evaluate their own roles and the roles of another group of participants in the planning, design and installation of IS. Summarised analysis data are presented in the following sections according to the roles of external IT companies, medical staff, and patients, the Ministry of Health and other regulatory authorities, specialists of healthcare institutions and managers of healthcare institutions, i.e. which roles other e-health participants assign to them and which roles they provide for themselves. The tables below present the quotes of various groups of respondents talking about the roles of the groups of e-health participants analysed and a summary highlighting the essence of individual quotes or group of quotes. The final section of the roles of e-health participants presents a summary of the compared perceived roles together with a theoretical model of knowledge management cycles for role distribution.

The tables providing interview quotes indicate the respondents' codes, where the number represents the number of respondents, the first letter of the code is the represented organisation (P – outpatient clinic or primary care centre, L – hospital, R – the Ministry of Health or other regulatory authority, IT – IT or external consulting company, Pr – private healthcare institution), the second code letter is current position of the respondent (A – administrative employee, including managers of healthcare institutions, IT – employee or manager of information technology, computer systems division, M – medical staff (doctor or nurse), VT – civil servant, P – e-health project manager, coordinator, D – manager of IT company).

5.2.1. Role of the Ministry of Health

According to the theoretical hypothetical model of the role distribution during the knowledge management cycles, the Ministry of Health (MoH) should mainly function as a coordinator, with the exception of the creation of new knowledge (specialist's role) and formation of a consensus knowledge (where it plays like an evaluator).

Respondents of all the groups recognise the important role of the MoH and its high impact on the success of the e-health projects (**Table 5.7**). According to the directors of Healthcare institutions, legal regulation has a decisive influence on the project effectiveness. Without a proper legal basis, even the best-executed projects will not produce the expected results. As for all development phases of the e-health system, and especially the planning, the necessity of coordination and management was emphasised. Respondents emphasised that at this stage it is necessary to have a central decision body, which is responsible for the development of e-health; otherwise no goals of any initiative will be implemented. These are the roles, associated with the Ministry, which, in eyes of the respondents, plays a critical role in coordinating and directing the pursuit of a common goal for all participants in the e-health system.

Table 5.7. Attitude of the participants of the e-health system toward the roles of the Ministry of Health

Group of participants	Generalised attitude	Confirming statements
Attitude of IT companies (external)	The necessity of central management	36-IT-D. We once asked the Ministry: "Do you imagine that you will have to establish an office?" They did not understand that... That there must be people, a continually operating office where at the very least a few people sit around the clock to provide information to all users because crashing of the system as such means that the entire health system stopped.<...> I think that the Ministry itself needs to do a lot which is very little involved here.
Attitude of MoH	Role of a coordinator	32-R-VT. We, the coordinators, have started something at the eMoH: <...> we included a certain list of features, and are forming provisions for the case summary...
	The importance of state contribution	32-R-VT. Well, if we talked about funding for the e-health system development, of course, there is a better model that the state would be able to allocate from its budget. Then we manage time schedules.
Attitude of the specialists at the healthcare institutions	The importance of the role of a strong centre and a coordinator	24-L-IT. MoH has to coordinate and determine the e-health. With regard to the systems' integration, its role is very important.
	Losses due to decentralised creation of the e-health system	26-L-IT. In the same way, the Ministry could have created a single product for the whole of Lithuania and there would be no need for some new systems that could integrated and would do interlink with each other, by sending some data, and holding back some other... Well, so it seems that instead of spending now a hundred million, it could have spent fifty and to reproduce it in all the healthcare institutions.

Group of participants	Generalised attitude	Confirming statements
Attitude of the management of the healthcare institution	The importance of the stability of responsibility	42-P-A. Someone should feel to be a master. And if it (e-health – author's note) is like some kind of a transitional red flag <... > then I with my ideas, bright and attractive will fail to complete any project.
	The necessity of the central management	51-L-A. It would be ideal if the Ministry said, "take it and use it." 11-P-A. I wanted a national system, established centralised steps on how regions should join the system. 23-L-A. It is important for the MoH to be the nucleus (for "bridge-building" among the programmes). 25-L-A. But I think that the starting point should be the Ministry only and then to network all the institutions into that structure because in principle the whole Lithuania is connected.
	The importance of legal regulations and procedures	22-P-A. The Ministry has the biggest influence and the strongest role in the success of the e-health projects. The projects can be executed very well, but if the legal framework is not adjusted, the efficiency will be limited. 1-P-A. The worst of all is the absence of regulation, and you need to make a decision. We forward a letter. To the Ministry, of course, because it is not within my competence to turn to the Seimas, I am too small...The Ministry is enough for me; I do not involve myself in attacking... just daily communication. 3-L-A. For me, it is important the implementation of the initial idea: what will the interrelations be in the system in order to be able to "move" among institutions. I do not need all the records, but it is important to know the basic things. This is the very function of the Ministry.

However, the respondents see the shortages in coordination; it was especially missing at the first stage of the national e-health system development (**Table 5.8**). In their opinion, before starting to develop a national system, it is necessary to clarify the existing IT systems, which are already implemented by the healthcare institutions, what needs they have and what immediate plans for digitization of health data. However, these aspects were not analysed timely and were not evaluated. The lack of coordination is regarded by the respondents as one of the main reasons that a number of different internal (at the level of an organisation) IS was developed, which are now difficult to link together to a single integrated system. Still, in the second stage of the national e-health system development the respondents from healthcare institutions (especially those which have less experience in developing e-health products) miss information, support and closer communication with specialists from the Ministry. It means that as stipulated by the theoretical model, some e-health participants hope that the Ministry will function not only as the coordinator but also in the specialist's role. On the other hand, the respondents, interested in the development of e-health, are aware that Ministry staff, responsible for the development of the e-health system, needs political support and adequate human resources. However, there is a lack of information about e-health even in the Public Communications of the Ministry, which shows the less importance of this area with regard to other healthcare areas. The shortage of political power and the lack of will in the Ministry were mentioned by some directors of external IT companies, who have noticed a deficiency on coherence between institutions, regulating e-health. According to them, there are persistent disagreements between the Ministry and other state-level institutions of the e-health system, and some institutions under the Ministry have a bigger influence on the e-health development than the Ministry itself.

Table 5.8. Attitude of Participants of the e-health system about the Voids in the Roles of the Ministry of Health

Group of participants	Generalised attitude	Confirming statements
Attitude of IT companies (external)	Need in more solid positioning of the Ministry	37-IT-D. I think that consultants can be hired only for very specific issues. What are the public officials for then?
		60-IT-D. Authorities subordinate to the Ministry of Health occupy a significantly higher position than he Ministry itself in terms of in the decision-making and influence.
Attitude of professionals of healthcare institutions	Lack of interaction with other e-health participants	24-L-IT. We participate, but they have no favourable attitude toward the initiative. When we call to make some offers, they show no interest and keep distance with phrases like “we will ask when needed”. I have episodic contacts only, not in essence. The work must be assessed in terms of achievement of the goal, rather than creating for the sake of creating…
		26-L-IT. You see, we are working on the project with the Ministry of Health and practically have no some kind of closer contact. They are neither advisers nor coordinators for us… Because after all it is we who are coordinating the things that connect our described functions with the realities of project implementation with CPVA (Central Project Management Agency), so we have to coordinate the required documents with them.
Attitude of managers of healthcare institutions	Devaluation of e-health area in the country and the Ministry	27-L-A. The key problem is the absence of the state position. 11-P-A. We should have more of such people from the Ministry, experienced ones so that the Work Group would operate in a centralised manner. I do not think there is anyone interested in e-health... Look at the Ministry’s booklet: analysis seems likes in progress, something is there, but nothing clear... And when we do a search using e-health as a keyword...

Group of participants	Generalised attitude	Confirming statements
	Lack of interaction with other e-health participants	23-L-A. Coordination is required. When a public authority designs any programme (like in the case of SveiDra of the National Health Insurance Fund), it should gather information on which authority has what, and only then begin creating the system.
	Inappropriate assignment of functions to the Ministry	59-Pr-A. eHealth should be supervised by an authority which has the most competence. The Ministry had none and does not really have presently. <...> It is in the competence of the Ministry to control institutions and administer systems. But the Ministry now prepares technical specifications. The Ministry's function is to form the health policy. It can determine what data is needed and order the data to show the activity of health institutions.
	Mistakes in selection of model of creation	8-L-A. A created national level core is necessary, but in fact everything happens on the opposite – from the bottom up. The process began at the wrong end...

5.2.2. Role of managers of healthcare institutions

At different knowledge management stages, managers of healthcare institutions (HI) according to the theoretical model should play different roles. At the early knowledge stage, they should have the design function and once the knowledge is being associated, this role should pass on to medical staff while the managers become professionals in their fields. In the creation of new knowledge, such professionals should become observers and evaluators and coordinate the process of finding a consensus between the participants. When knowledge is generated, the theory attributes the design role to the HI managers because of the need to make IS design and installation decisions.

The analysis of respondents' attitudes toward the roles of HI managers demonstrates the differences in opinions and experiences subject to the disposition of the managers and their activity in the creation of IS (**Table 5.9**).

Some of the managers evaluate e-health elements as an important area of HI activity, which must receive enough attention. The managers recognise that the dynamics of e-health system's creation requires constant monitoring and changes. Other managers take the initiative and undertake to manage the processes of e-health creation in HI. Meanwhile, respondents of other groups (especially IT professionals) have faced with HI managers walking away from the systems' creation activities, i.e. experience of these respondents shows that managers play a role of passive observers only. The managers consider only the fact of IS operating in HI under their control relevant. IS content and the process of its creation do not receive sufficient attention of the managers. The respondents also emphasise the need for the managers to have active roles as a 'silent' support is not enough. It is essential that managers, together with other stakeholders, address IS problems at all stages. If the management keeps itself at the distance and does not play a coordinating role at the appropriate stages, e-health solutions can be realised as best suited to certain groups rather than as such as HI, as an organisation, needs. Therefore, IS may be not balanced in the manner most appropriate for the organisation.

Table 5.9. Attitude of e-health system's participants toward the roles of managers of health care institutions

A group of participants	Generalised attitude	Confirming statements
Attitude of IT companies (external) Attitude of professionals of healthcare institutions	Lack of attention of HI managers to e-health	36-IT-D. And it all ends with the product being produced, given to the consumer and the consumers is surprised. Because it is totally different from what he expected. <...> Those systems are not interesting for the consumers. They want to have it, but they do not care about what and how it will be.
	Lack of understanding of HI managers of IS	37-IT-D. The managers are afraid. We are trying to communicate with information technology specialists of the institutions. Some of those even in the province have a highly qualified specialist, so we find common grounds. I even find it easier to talk to them rather than to the managers.

A group of participants	Generalised attitude	Confirming statements
	Necessity for HI managers to participate in IS creation processes	37-IT-D. The managers, rather than the project team, should regularly meet regarding this issue. The managers can then inform the customer, for whom this project is likely the first one in his life, because, in Lithuania, there are probably no such projects that are successful. This means that we have to provide a very good explanation to the customer's management how these projects are to be implemented.
Attitude of managers of healthcare institutions	Lack of active support of HI managers	26-L-IT. Such a silent support of the management is not sufficient. It has to be active, there has to be interest shown, there should be still... you know, such a collegial decision... Meanwhile, the solution, in the absence of interest on the part of the management, turns out to be somewhat different to what the hospital needs <...> but rather what IT or, say as separate groups of influence, find convenient. It may be somewhat unbalanced.
	Hierarchical principles of IS creation	9-L-IT. A lot of being done by force. The systems are being delegated downwards. First, the questions are raised for deputies, the deputies question their subordinates, and the doctors have their own interest, so they pressure us in their turn. <...> The authorities meet, they have their own wishes, the doctors speak to their subordinates, etc.
	Responsibility of HI managers for IS development	11-P-A. The system is sort of manager's concern. We constantly receive instructions on what we should do differently.
	HI managers – initiators of IS creation	8-L-A. Such a difference between me (HI manager – author's note) and the doctors is taking place because I am 'leading' the initiative.
	HI managers – the implementers	25-L-A. Well, in the regions we are the users, the installers … that's all… but I don't think that we have to form a certain doctrine.

5.2.3. Role of external IT companies

In theory, at early and associated knowledge management stages IT companies should play a supervisory role as the current situation in e-health system is known and there are new needs provided by the internal participants of the healthcare system. However, at the stage of creation of new knowledge IT companies become the makers because they know best how (and if possible) to properly meet the requirements of an IS system to be created. After other e-health participants search for a consensus (stage of consensus knowledge) and agree on IS elements (stage of result knowledge), IT company plays the role of the implementer while realising the needs of the customers.

Attitudes regarding the roles of the external IT companies were different compared how IT companies perceive their own role and what roles other e-health concerned parties assign to them and/or what experience other e-health concerned parties have with them (**Table 5.10**). The respondents from IT companies provide a variety of functions for themselves. In their opinion, IT companies play a maker role because users have no opportunities to predict the end result. Nevertheless, most often the role of IT companies is emphasised as implementer role, recognising that IT products are developed according to customer needs. Also, interviews revealed neutral position attitudes when responsibility is not taken for the existence of the created product. According to the representatives of IT companies, their mission is to submit proposals and create a system, but they do not assume responsibility for the use of this system.

According to other e-health participants, IT companies have the only role, which is to realise their needs. So in the opinion of HI managers, there is not much of a difference in terms of what who will be the service institutions; what is most important, is for the needs to be realised. Some respondents, for example, medical staff, often even do not feel the points of contact with IT companies and show no interest in it. Others, talking about their contacts with the representatives of IT companies, mentioned that they often do not realise the complexity of the health system. The health area collects a lot of different data as related to complex connections during data processing, whereas IT companies begin to communicate with HI being unfamiliar with health area requirements. However, many e-health participants observe that IT companies, as implementers, try more and more to realise customer needs due to the growing competition. The growing competition, according to the representatives of the Ministry of Health, is an excellent reason to increase the quality of e-health products. It gives customers the freedom of choice and independence from inappropriate IS developer, installer and/or supervisor. Moreover, competition between domestic and foreign IT companies entering the market helps in ensuring the continuity of IS maintenance and improvement because if one installer fails to meet expectations, it is possible to choose another IT company, which would provide proper service of the systems.

Table 5.10. Attitude of e-health system's participants toward the roles of IT companies

Group of participants	Generalised attitude	Confirming statements
Attitude of IT companies (external)	Problem of IT companies is indefiniteness of customer needs	36-IT-D. Here we have the true general rule – the user never completely knows what he wants. Until he 'feels' the final product, he won't tell you what is wrong. And he will 'feel' the product at the very end. It may be the case that once the product is introduced to the user, it comes to the light that the analysis needs to be changed, but no one changes it anymore.
	Need in constant IS development	37-IT-D. The systems must be constantly developed. If the company drops the curtain stating "that's all, we have programmed everything, you can file no more claims", then such a system would be gone within 3 years because the documents are changing and already half a year later the system will have substantial drawbacks though it was fully realised in a neat and complete manner. The systems need to be monitored.60-IT-D. Most often the systems are developed by those whoever did the system from the beginning because they have all the competitive edge to win that development project. This is due to the fact that this company knows how, who and what it was done with. Hence, this company can make adequate assessments and offer a good price. When another installer comes to work with a system already created, the price is automatically higher.

Group of participants	Generalised attitude	Confirming statements
	Basis of IT companies' operation is customer needs	37-IT-D. Our strategy is as follows: when there is a need we create the product. 36-IT-D. We are not the ministry, we cannot say that "so here we have created a very good system and you must use it". We show how it works. If you want – you use it.
Attitude of medical staff,	Gap between IT companies and medical staff	7-P-M. Which IT company has won the tender? No,, I don't know because it is not really relevant to me. 28-L-M. This is not in my competence.
Attitude of Ministry of Health	Competition is the base of improvement of IT solutions' quality	32-R-VT. Constant distress. A contract is signed, let's say, for system service. If the installer provides no services, then the other installer can provide services for the same object. There is a crowd of the installers! Their number is growing according to our programme. There is an interest, so companies from the neighbouring countries appeared. Those are a global company, well maybe not global, but the company with branches in several countries, which have solutions and adapt them for Lithuania.
Attitude of professionals of healthcare institutions	Basis of IT companies' operation is customer needs	4-L-IT. They listen to our needs. There are no other options... 18-L-IT. Do they listen attentively? Yes. But it is clear they submit no offers. They help when problems come up.
	Competition is the base of improvement of IT solutions' quality	14-L-IT. IT companies try to comply with the requirements. To implement such requirements, they became more flexible. I not them, then there will be someone who would do it. This is the 'engine'. There is a competition. 33-Pr-IT. IT companies need to hires only when they know our systems. It is dangerous to work with one company because then it would feel irreplaceable. An internal competition is needed.

Group of participants	Generalised attitude	Confirming statements
	Creation of e-health IS is politicised	26-L-IT. Some are interesting just for their innovative solutions, but can be pushed out of the market only because of the fact that to the date they performed zero number of installations in Lithuania. There will be companies like that. I think that such companies that offer appropriate solutions, which are programmed in a very good technological sense, will not be accepted on the market for the fact that there are political decisions, well... political orders, political forces.
	Condition of high-quality IT solution is specialisation in the health area	33-Pr-IT. Large companies are less reliable. Their bureaucratic apparatus is very complex affecting the quality in a negative way. <...> Besides, the large ones have no particular specialisation. But e-health just a programmer is not enough. The company needs to understand the specifics, i.e. whom it is created for, what it is needed for, and how it would operation. The medical sector has quite a number of nuances that need to be understood.
	Importance of communication in creation of IT solutions	33-Pr-IT. We try to work with those who want to communicate. <...> Sometimes it happens that a manager of an IT company takes on the communication, but this is not a common practice. For the manager, the most important aspect should be the general profit of the company, but for us, it would be better when the project manager performs specific job. We are trying to communicate with those who do specific work.
Attitude of managers of healthcare institutions	The motivation behind IT companies' activities is to receive sufficient payment	51-L-A. The role of IT companies is good, just superb! They come right away, then talk, and then tell the prices … Thank you and good bye. 59-Pr-A. An IT company really would leave no code, and it's only the question of when they advance the price.
	IT companies lack the understanding of the health system.	23-L-A. The problem of IT companies is that they come without knowing the requirements. They don't know how many different data need to be submitted in the health area. We tell what is needed, but they come unfamiliar with the requirements and with what needs to be done.

Group of participants	Generalised attitude	Confirming statements
	Customer needs are in the first place	8-L-A. So the tender. The winner of the tender will do what we need.
	Importance of communication in creation of IT solutions	56-Pr-A. I address the IT company when I need to. <...> We always have them in front of our eyes. Even at the installation stage.

5.2.4. Role of specialists of the healthcare institutions

According to the theoretical model of the role distribution at the knowledge management cycles, the Healthcare specialists (IT staff, accountants and so on.) at the stages of prior, associated and new knowledge play the role of the executor as it is needed to turn the ideas into reality. When there is agreement on alternative solutions, they fulfil tasks independently, and after the creation of a product, they have the observer's role, who is coming to support the IS users.

Expectations and experiences regarding the roles of professionals at Healthcare institutions, and especially regarding IT professionals, from their personal point of view and in eyes of other e-health participants, are different (**Table 5.11**). They are recognised as one of the key players in determining the success of the IS project at the Healthcare institutions and are regarded as one of the determinant success factors of e-health deployment in Healthcare institutions. Representatives from external IT companies trust them as professionals who are able to represent the interests of customers because managers often cannot adequately explain the Healthcare institution needs and requirements of their realisation. Managers of some Healthcare institutions appoint IT professionals in the role coordinator and former. From their point of view, the IT department may be the centre of the collection, analysis and coordination of the opinions of the e-health participants, providing the suggestions to management. The role of IT professionals as implementers is also highlighted; when they not only provide ideas, but they are also better IS developers because later they can ensure the continuity of the operation of the system. Respondents IT professionals observe the change of their roles. Previously, they were expected only individually develop and maintain systems. Currently, however, they complement and support with their knowledge the needs of other e-health participants, especially the medical staff. Just like the theoretical model anticipates, the observer's role of the IT specialists at the Healthcare institutions is very significant for the Healthcare institution administration and medical staff. Respondents often mentioned that IT professionals provide methodological assistance in learning to use the systems, give a continuous support in case of some daily usage problems.

Table 5.11. Attitude of the participants of the e-health system toward the roles of the specialists of the healthcare institutions

The group of participants	Generalised attitude	Confirming statements
Attitude of the IT companies (external)	The importance of the qualification of IT specialists	36-IT-D. We try to communicate with the IT specialists of the institutions – some of them even in the peripheries have very qualified persons and we find our common language. For me, it is even easier to talk to them than to talk with the management. 41-IT-P. A lot depends on the employee of that institution. Some specify clearly their requirements that "I want to have black here and white right here". And other might say that "well, do it as you wish".
	Separation of the functions of an IT company and IT specialists	36-IT-D. We are not responsible for their computers and other hardware, which breaks, crashes and makes all kinds of twisted tricks. You must have a person, available instantly, who will solve your issue. Often it happens to get a call that it does not function; we do not receive data from the health insurance funds. What can you tell to them? You say – look for your own IT specialist and he will solve everything because we have already explained 3 times to the eMoH how these connections have to be restored and he knows how to do it.
Attitude of the medical staff	IT specialist – assistant	7-P-M. Different ways of communication. If it stumbles, they come, teach. You go and learn.

The group of participants	Generalised attitude	Confirming statements
Attitude of the specialists of the healthcare institutions	The IT specialist is a participant in all the stages of IT creation, implementation, and subsequent processes	4-L-IT. Very often IT people encourage with their ideas, do the creation work without subcontractors because for the continuity it is better to work without them.
	The need to coordinate IT solutions with other participants	9-L-IT. From the beginning the attitude was that IT people are just responsible for the systems, now everything is coordinated with doctors, they have to speak up their needs.
	Ignoring the initiatives of the IT specialists	24-L-IT. We participate at the time of modelling, but when it goes to the initiative, they do not take it positively. If you call and suggest something, they are not interested and reject: “When we need, we will ask ourselves“.
Attitude of the management of the healthcare institutions	The importance of the qualification of IT specialists	3-L-A. I believe that our main success is the IT team, seven people, young enthusiasts; some of them work from the very beginning. Not lazy to act, to support, all know the telephone numbers, they are constantly helping, some more on the programmes, others are more for the technical things.
	The area of knowledge of the IT specialists is too narrow	5-P-A. The IT specialist has a narrow area. He cannot finalise all loose ends.
	IT specialist–coordinator and initiator	8-L-A. The opinion of the IT specialist has to be the most important. All the suggestions are supplied to the head of the IT department. He does not just collect them, but makes summarising of afterwards and proposes what needs to be done.
	IT specialist – assistant	1-P-A. Yes, gives guidance, supports in using. 3-L-A. They constantly come to help. 56-Pr-A. IT is always in front of us. Especially during the installation period.

5.2.5. Role of medical personnel and patients

Different stages in knowledge management, according to the theoretical model, assign different tasks to medical personnel. They act as specialists in the first (per-planning knowledge) and last (result knowledge) stages. At the beginning of the process, they know best what information needs to be included in the IS, and at the end they become the main creators of this digital information and users of the IS. At the level of associated and shared knowledge, the medical personnel plays the role of the shaper, sharing and coordinating the knowledge of various medical professionals. At the stage of new knowledge, doctors and nurses become coordinators because they have to decide what amidst the abundance of available knowledge meets their needs best.

When speaking about the role of medical personnel some of the respondents identified the problem of the main beneficiary for whom this e-health system is created: is it the medical personnel or the patients (Table **5.12**). While this question is not resolved at the national level the work of the medical personnel up to this point do not have their workload lightened (if the main user is the medical personnel), and the patients are not sufficiently involved in the creation of the system and its assessment (if the decision is that the systems are created for the benefit of the patients). In either case the respondents do not focus on the role of the patients, but see them only as observers: “The patients do not participate anywhere and that is not necessary; we know what their needs are (23-L-A). As the results of the research that has been carried out in Lithuania show, the inclusion of the users (both patients and medical personnel) into the creation of the e-health system is still quite problematic: only 2.6 per cent of the citizens and only 7 per cent of the medical personnel participate in creating the system and only 2 per cent of those citizens who use e-health system actively contribute to the improvement of the system by sending in their suggestions. Yet it should not be claimed that it is necessary to include as many patients as possible into all the steps of creating and installing the e-health system because they may lack the knowledge when it comes to certain stages. The most important part is to consider the needs of the patients as future users of the system at least at the beginning of a certain module design and to take into account their evaluation of the e-health service quality. Besides, the general level of social involvement among the residents of Lithuania and the patient organisations, the general level of computer literacy among the health service recipients, the newness of e-health system, the scope of e-health accessibility and other factors may inhibit the inclusion of the patients into the process. Yet it should be noted that some healthcare institutions find active patients and include them in the early stages of creating e-health IS not limiting their role to just evaluating the quality of the IS that has already been installed. Yet other healthcare institutions use patient surveys to evaluate their level of satisfaction with the systems: "but we do survey. For example, even now we have collected 500 patient surveys" (5-P-A).

The results of the interview reveal that the medical personnel plays a critical role and yet this group of e-health participants is one of the most complex. The most sensitive question is including doctors into the creation of the IS without interfering with their primary work. The primary work of the doctor is serving the patients, so when it comes to creating, instaling and improving the IS< the doctor is burdened with additional work. Besides the medical personnel has little motivation to participate in creating and instaling IS because this complex process distracts them from working with patients. From the point of view of the doctors, e-health tools make their work more complicated and take up a lot of time instead of improving working conditions. Extended IS design and installation processes and continuous development, during which the programme does not function well, exhausts the medical personnel and interferes with their main activity, serving the patients. Seeking to mediate such situations, the administration of the healthcare institutions try to inform the staff in advance and achieve that they would at least play the role of observers and evaluators while the program will be made ready to use, and the doctors and nurses become independently working specialists. In order to achieve this some healthcare institutions pay great attention to this question and organise e-health participant information meetings, refresher training with a particular focus on those participants who are most reluctant to use the IS or those who have the hardest time using it. The management of healthcare institutions realise the importance of these measures in motivating the medical personnel of accepting e-health system as an integral part of health services. Even though most healthcare institutions include the medical personnel only when the systems start functioning, and they need to start using them, some organisations do not leave their medical personnel behind from the initial stages. Because they realise the importance of the doctors and nurses as the shapers and they use various ways to encourage the participation of the medical personnel from the very beginning stages of IS creation and to listen as well as respond to the needs of the medical staff. Some respondents, who are doctors, remember participating in task forces, where specialists from various fields could express their needs, and their opinions were considered and discussed. The consensus decisions then became the basis for creating the systems.

Unfortunately, during the interviews the management of the healthcare institutions and the IT specialists expressed the opinion that the medical personnel plays only the role of users and have little role to play in the earlier stages of the process. The roles of shapers and coordinators, as described in the theoretical model, are rarely ever considered. The administrators often emphasised that only when the program is created and the training has been organised is it possible to discuss it with the medical personnel and to glean insights about the most useful and needed functionalities of the IS for this group of users. On the other hand, in certain cases the healthcare institution specialists take this role onto themselves and do not see the need to integrate the medical personnel into the creation of the system. When the medical personnel begins to use the systems, they assume the role of the specialist and help solve the technical problems that arise. The latter respondents claim that it is easier to respond efficiently to the problems as they arise rather than to try gleaning this information at the early stages of creating the IS from the doctors who do not want to spend much time on additional work.

Those healthcare institutions that see the greatest gap between their medical personnel and the creation of the e-health systems named the low level of motivation as one of the main issues. The respondents mentioned that there were few doctors who would be interested in improving the system. The most common practice is that there is one enthusiastic doctor who tries to sum up the needs of the other colleagues. The representatives of the medical personnel did not deny that they have little motivation to use e-health tools. Quite a few respondents from this group claimed that the systems get in the way of work and take up time which should be used for patients, thus they try to focus as little as they can on the usage of the IS, not to speak of active involvement in creating and installing the systems. Yet it was noticed during the interviews that very few healthcare institutions could not identity at least one doctor and/or nurse, who would not be interested in the IS and would not actively participate in all processes of creating, installing and supporting e-health system while at the same time representing the needs and interests of the medical personnel. Besides, as the computer literacy of the doctors and nurses increases, positive changes have been noticed in the rise of participation among these e-health system participants.

Table 5.12. The attitude of e-health system participants toward the role of medical personnel

Participant group	Generalised attitude	Confirming statements
IT companies‘ (external) role	The importance of computer literacy	60-IT-D. Most doctors are of an older age, and they are more used to paper and not to some IT things. It is much easier for him to write something on paper than to type it into the system. So again, they say, you need to have some person who will sit there and enter information and use the doctor‘s signature to sign the documents 40-IT-P. Say, in 2008 we had to go to the medical institutions and train their staff, the ladies, and the nurses, let’s call them that. They did not know how to use the computer at all; well they had not even seen one. Now the level of knowledge is much different.
The attitude of medical personnel	Listening to the medical personnel before creating the systems	30-L-M. They ask for our onion. I was even on the committee that was made up of doctors representing different fields, and we gave our suggestions about what we want, and the system was created with that in mind. 28-L-M. There were these surveys; they asked us what it was that we wanted, how to do it better. 53-Pr-A: as a doctor, I was in several meetings at the ministry <...>Later, based on that, we explained what did not fit reality in this project.

Participant group	Generalised attitude	Confirming statements
	Doctor‘s priority is working with patients	30-L-M: When designing systems, one has to understand what the doctor has to do, to serve patients or to do some other work. So they try not to overburden the doctors. The nurses enter the date into the system. The doctor cannot distance himself from the patient.
	Not seeing one‘s role in creating the system	34-Pr-M. Should something be changed in the system? That is not up to us to say.
	IS is a more disturbing than helping means in the work	57-Pr-M. I will tell you honestly, that in other institutions I have no time and no computer so that I could figure out all the buttons. The system is more of an obstacle to me. I have no time for it. 28-L-M. The attitude of the doctors is such, that e-health tools have to make the doctor’s work easier, not harder. The continuous processes of installation and development, unstable functioning of the systems that have already been installed, exhaust and annoy the personnel.
The attitude of the Ministry of Health	The resistance of medical personnel	32-R-VT. It development is a complex matter, of course... It does have that aspect of resistance. The change is hard because there is the factor of time, which the doctor can postpone.
The attitude of healthcare institution specialists	The need for the enthusiasts to represent the needs of the personnel	18-L-IT. There are few doctors who deal with the development of the system. One doctor wrote on behalf of all. There were few people who gave suggestions. There is a lack of enthusiasm. We still need to know, what is best for doctors.
	Doctor‘s priority is serving the patients	6-P-IT. If the doctors are working, if they are busy with what they do, they want to spend as little time as possible figuring it out. It is easier for us to adjust. If some problems arise, that is when we ask them.
	The necessity of evaluating doctors’ needs	9-L-IT. Initially, the attitude was that only IT people are responsible for systems. Now we coordinate it with doctors; they have to express their needs. But there is much that is dome only because it is compulsory.

Participant group	Generalised attitude	Confirming statements
The attitude of the management of healthcare institutions	The need for specific knowledge in creating IS	55-Pr-A. Then we will work with the doctors so that each would enter their content. <...>Well, the doctors fill in what are the possible complications of this intervention and such.
		25-L-A. The process of installation is very complicated. <...>We need to install this using administrative means. Otherwise, there is no nice way to do it...
	The devaluation of the interests of medical personnel	27-L-A. Exactly, we need to motivate these people, to include them not only at the informational level but to achieve their active participation. To tell you the truth, they are not very interested. And probably should not be.... 13-L-A. The doctors are not so well informed (regarding the creation of the IS – author's note).
		53-Pr-A. You try to do it nicely. You get a few of them (doctors – author‘s note) together, show them that maybe it will be easier; everything is adapted so that it would be easier for you. You try to show them that. 8-L-A. Every time you install something new, you hold a meeting, have training, explain, and then work individually. If you want the person to work, you have to persuade them, right? 53-Pr-A. A nurse can one work with one doctor, transfer and enter a lot of data. Even a technical worker would be best here. 51-L-A. Sometimes the nurses do too much for the doctors, they are like secretaries. 25-L-A. So discussing with personnel is possible only at the training stage, when you need to make it real for them, teach them how to use some specific functionalities that this doctor will need and so on. 3-L-A. There are some who show an initiative to use e-health system; they want their department to be more attractive so that their colleagues would come to read.

5.2.6. Comparison of the distribution of stakeholder roles in the theoretical model of e-health and the respondents' attitudes

When comparing the realization of hypothetical distribution of roles in the theoretical model of e-health and the way that the participants of e-health understand their own role and the role of others in the knowledge management cycles shows that there are quite a few contradictions between the practical approach and the theoretical principles. At some points, the difference regarding the role of some participants between different groups became apparent (**Table 5.13**).

The role of IT companies. The greatest mismatch between the IT companies' roles, as they are defined in the theoretical model and the way they are conceived by e-health participants, is in regards to their role as shapers. No group with the exception of the Ministry of Health sees IT companies as shapers. Meanwhile at the stage of new knowledge creation IT companies perform exactly this role because they are the only ones who have reliable information about the technological specifications, problems, solutions and practices from other countries, where e-health system is already functioning, related to designing e-health information systems.

The role of medical personnel. The medical personnel at the different stages of knowledge management cycle has to play all active roles, with the exception of observer/evaluator role, which is more passive. However, it is only the management of healthcare institutions that sees a wider range of roles that the doctors perform in comparison to the attitudes of other e-health participants. Some respondents see the medical personnel performing only the role of the user, who gets in the way of progress.

According to the respondents, the patients have either no role in designing, installing and developing e-health systems or are merely observers, who could theoretically contribute their opinion as evaluators, but only a certain part of participants care to hear this opinion.

The role of the Ministry of Health. According to the hypothetical model of the theoretical distribution of e-health participants' roles, the Ministry of Health should play the role of coordinator at the first and the last stage of the implementation and should contribute to the process as a specialist when new knowledge is created. At the stage of sharing knowledge, the ministry should observe and evaluate how the stakeholders seek the best

Table 5.13. Generalised comparison of theoretical roles and practical approach in e-health system

Knowledge management (KM) cycle

Pre-knowledge → **Associate knowledge** → **New knowledge** → **Consensual knowledge** → **Out-knowledge**

Roles[558]:	**The role of external IT companies**	**The role of medical personnel**	**The role of patients**	**The role of MoH**	**The role of healthcare institution specialists [559]**	**The role of healthcare institution heads**
According to the theoretical model of KM / **Respondents' Attitude**	observer → shaper → implement.	specialist→ shaper→ coordin. → shaper → specialist	observer	Coordin.→ specialist→ observer→ coordin.	Implement. → specialist → observer	shaper → specialist → observer → coordinat. → shaper
The attitude of external IT companies	Implement., specialist	User, observer, shaper	observer	Shaper, coordin.	User, implementer	observer, coordinator
The attitude of medical personnel	Implement.	Implement., user	No role	*They do not talk about it*	Shaper, specialist, implementer	*They do not talk about it*
The attitude of the Ministry of Health	Implement., shaper	Observer, specialist	observer	Coordin.	*They do not talk about this*	shaper
The attitude of healthcare institution specialists	Implement., specialist	Specialist, shaper, user	Shaper, no role	Coordin.	implementer	coordinator, shaper, observer
The attitude of healthcare institution heads	Implement., observer	Shaper, observer, implement., user, specialist	observer	Coordin., shaper, observer	Observer, specialist, implementer	shaper, coordinator

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[558] Abbreviations: *coordin.* – coordinator; *implement.* – implementer.

[559] Healthcare institutions specialists: IT specialists and accountants

and most acceptable decisions in designing e-health system. Yet the respondents, including the representatives of ministry, do not see the ministry in the role of the specialist and emphasise that it should take on the role of the coordinator and at certain stages should assume the role and responsibility of the owner. Quite a few respondents reflected that up to this point the ministry did not perform the role of the coordinator in the e-health development process well enough and changed its opinions often, which created additional difficulties and problems.

The role of the healthcare institution specialists. According to the theoretical model of role distribution, the specialists working the healthcare institutions perform the role of support in the initial stages of the knowledge management cycle (when the existing knowledge is identified, and new knowledge is created) and meet the needs of other e-health system participants within their area of competence, that is, that act as implementers. Yet it needs to be noted that in these stages the role of HI specialists changes based on whether they create the e-health systems themselves or purchase these services from external companies. When they create the internal healthcare institution systems, their main role is that of an implementer; when the services are purchased they act as specialists, who closely collaborate with service institutions. From the standpoint of the medical personnel, healthcare institution specialists perform more roles (act as shapers, implementers, and specialists). It is conceivable that such an attitude has developed because IT specialists is the person who is the closest to medical personnel in helping with various IS and computer technology related questions, from solving technical problems to training and helping whenever there are problems with the IS.

The role of the management of a healthcare institution. The theoretical model of the distribution of e-health participant roles assigns all but implementer role, which at different stages of the knowledge management process is carried out by other participants of the e-health system to the management of the healthcare service provider institutions. Yet in reality the management does not see themselves in the role of specialists, who should articulate their position at the stage of associated knowledge. The respondents in this group usually see themselves in the role of need shaping coordinator, but do not see that they should take on the role of responsible observer and evaluator role when new knowledge is created. It is conceivable that this role, in their opinion, belongs to the IT specialists and/or external IT companies and they forget about the distinction of roles because at these stages the latter should act as shapers and implementers. According to other e-health participants, the management is not involved enough in implementing and creating IS and acts as passive observers who either do not have or do not express their opinion and are not interested enough in the process while they should assume the role of leader. Once the systems are installed, the management should play a more active role in coordinating the development of the IS in their institutions.

5.3. Problems of the development of the e-health system from the point of view of the e-health participant

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Interviews revealed several key areas where the existing problems, from the respondents' point of view, make the greatest impact on the e-health system development:

- The legal framework and regulation of the e-health system;
- Cooperation and communication between the participants of the e-health system;
- Internal problems of the organisation in planning the development of e-health;
- Architecture and design solutions of the e-health information systems.

Analysing the frequency of statements for each of the problem areas it is observed that for the respondents, in general, the most relevant area is the legal framework and regulatory system of the e-health (263 statements documented). The second place in terms of relevance goes for the problems of the architecture and design solutions of the e-health information systems (the respondents mentioned peculiarities of this area 232 times). According to the frequency of statements the following problems are behind the above-mentioned problem areas: cooperation of the participants of the e-health system (111 statements) and communication and internal organisation features in planning the development of Health (116 statements). It should be noted that the largest amount of respondents was managers of healthcare institutions and other management staff of the administration and representatives of the external IT companies, and for the respondents of these groups of respondents the most relevant were the first two problematic areas (below). Therefore, the statements of these health participants make up the largest part of the frequency of citations in respective areas.

Let us analyse the content of the problematic areas, what main challenges and strengths in each area the respondents notice. Tables 5.14.-5.17 show problem areas and the problems identified with them, listed as per the frequency of statements.

In the field of *the legal framework and regulatory framework of the e-health system* the respondents most often mentioned the lack of the state level organisations (under the ministry or not under it) to coordinate e-health activities (**Table 5.14**). Many respondents were concerned with financing for the e-health system development, emphasising excessive control of this area, the lack of strategy, passing of unnecessary and costly decisions. Problems arise because of the mutually incompatible laws, unclear regulation of roles and functions and also because of the fact that institutions fall short to execute projects or install systems, and meanwhile, the legislative framework has been changed and new requirements arise. The problems of interoperability of information systems, data security and privacy, procurement are also regarded as problems of the insufficiently developed legal framework. According to the respondents, development of the e-health system is disturbed by too much control from state authorities, the indolence of public institutions in decision-making, unnecessary bureaucracy, the lack of long-term planning, as previously short-term decisions were taken when there is a permission to create a lot of everything, but without compatibility. The lack of political will to unify systems, to take necessary decisions for standardization, lack of the ability to prevent lobbying and political pressure, unregulated competition, lack of competencies in governing institutions and other problems, from the point of view of the respondents are also regarded as the outcomes of gaps in the legal framework and regulation of the e-health system.

Table 5.14. Content and topicality of the problems of the legal framework and e-health system regulation area with regard to the frequency of respondents' statement

Item. No.	Content of the problematic area	Frequency of statements
Total:		**263**
1.	Lack of coordination, central organisation	77
2.	Funding, shortages in EU funding, EU recommendations	43
3.	IS compatibility	41
4.	Lack of legal framework and regulations often changes in it	38
5.	Issues of data security and privacy	30
6.	Public procurement	26
7.	Control and bureaucracy	19
8.	Lack of a long-term planning	18
9.	Lobbying and political pressure	12
10.	Lack of political will	10
11.	Indolence of the state institutions, lack of confidence in partners	9
12.	Competition in the market	8
13.	Lack of competencies at MoH	5
14	Double work with electronic forms	4

The problems in the area of cooperation and communication between the participants of the e-health system, which were most frequently mentioned by the respondents, are related to the problems in dealing with the relationship between and with the state organisations (MoH, the Health Insurance Funds, the Centre of Registers etc.), external IT companies, installers and problems, faced while developing cooperation with and among healthcare institutions, developing and implementing e-health projects (**Table 5.15**).

Table 5.15. Content and topicality of the problems in the area of the cooperation of the participants and communication with regard to the frequency of respondents' statement

Item. No.	Content of the problematic area	Frequency of statements
Total:		**111**
	Communication among or with state authorities	41
	Communication among or with IT companies	32
	Communication with installers	19
	Communication among or with the healthcare institutions	19

The content of the problems in the area of the internal problems of the organisation in planning the e-health development comprise issues starting with the shortages in staff motivation and competence to the lack of financing and technical equipment (**Table 5.16**). In most cases, respondents emphasised the staff's satisfaction with the existing and newly developed e-health IS, expressed concern regarding the competence of the employees and its development in this area (not only regarding the medical staff, but also IT specialists), regarding projects preparation and implementation obstacle, problems due to the approvals and terms of the documentation of projects. As an important problem of the effective management the respondents mentioned that the leaders of Healthcare institutions are not involved in the planning and implementation of e-health processes, and the doctors and nurses are burdened with extra work filling in documents. Representatives from regional healthcare organisations said that the problem of the lack of computer equipment is still unsolved due to lack of funding.

Table 5.16. Content and topicality of the problems in the area of the internal problems of the organisation in planning the e-health development with regard to the frequency of respondents' statement

Item. No.	Content of the problematic area	Frequency of statements
Total:		**116**
	Staff satisfaction	42
	Computer literacy of the staff, competencies in e-health area, adaptation to IT innovations	27
	Preparation and implementation of the projects	18
	Terms, approvals	11
	Lack of effective management	9
	Internal regulation of the e-health area	5
	Peculiarities of the medical staff	2
	Lack of financing, technical equipment	2

Within the area of architecture of e-health information systems and design solutions the respondents most often mentioned *how* difficult *it is* to predict the final product *so it* meet*s* the changing expectations and needs of all the participants of e-health, the issues of the identification of needs and their coordination, difficulties in maintaining and developing the IS (**Table 5.17**). The above problems in a numerical sense somewhat precedes the problems of the training of the e-health users, improvement of IS, troubleshooting, and difficulties, arising from the wish of customers to electronically display the existing paper forms. The following issues were less frequently highlighted in the area of architecture and design solutions of e-health information systems: involvement of stakeholders and difficulties making decisions regarding the architecture and design, deficiencies in the technical base, challenges at testing, the peculiarities of IS design and visual outcome of the final product, the complexity of the architecture, the slowness of the IS development process. Also, some respondents indicated topicality within this area in the financial capacity, limiting the creation and development of IS, the restrictions due to the public sector and problems arising from the reluctance of IT companies to accept the risk.

Table 5.17. Content and topicality of the problems in the area of the e-health system architecture and design solutions with regard to the frequency of respondents' statement

Item. No.	Content of the problematic area	Frequency of statements
Total:		**232**
	Final product, meeting the expectations	59
	Clarification of the demands and coordination	48
	IS maintenance and update	27
	Training	19
	Revisions and improvements of the system	16
	Seeking to shape electronically the forms the same way as if they were on paper	13
	Crashes	10
	Involving stakeholders and taking decisions regarding architecture and design	7
	eHealth competence of IT companies	6
	Technical facilities	6
	Testing	6
	IS design, visual outcome of the final product	5
	Complexity of IS architecture, the slowness of the development process	5
	Limiting financial capacities, limits of the public sector	3
	Risks, taken by IT companies	2

The analysis of quantitative parameters of the interview according to the relevance of the problem areas for individual groups of e-health participants shows that healthcare institution managers highlight legal framework area (**Figure 5.6**). This area has been the greatest concern for the healthcare institution professionals and representatives of state institutions as well. Meanwhile, the medical staff considers as the most topic to be the challenges related to architecture and design solutions of the e-health information systems. Representatives from external IT companies during the interview focused on the legal framework for e-health systems and regulatory problems and difficulties arising due to the formulation and realisation of the architecture and design solutions of the e-health information systems.

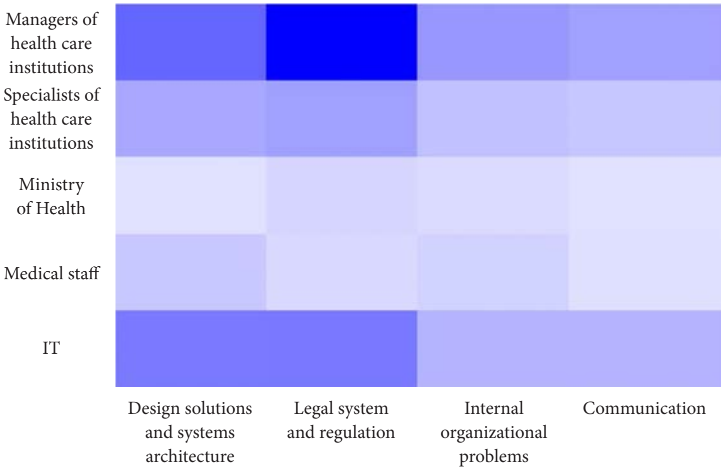

Figure 5.6. Frequency of respondents' statements about the problems in creation, implementation, and development of the e-health system

The following subsections provide a qualitative content analysis of the interview data, highlighting the most specific generalised problems in each of the four areas, and the tables include not only the quotations illustrating these problems, but also the original respondents' statements, distinguished from the general context.

5.3.1. Issues on legal regulation of the e-health system

Legal regulation issues of the e-health system are the most typical for representatives in all the groups of respondents, except for the medical staff. While analysing the problematic content of this area, more than ten topics have emerged, several of which had specific more narrow topics identified (**Figure 5.7**).

Respondents believe that the greatest impact is done and the greatest role for the success of the e-health projects is played by the ability of the Ministry of Health to standardise and regulate the area of e-health. One of the reasons for failure in the previous development phase of the e-health is the absence of strategy, legislation, and the institution, governing the process.

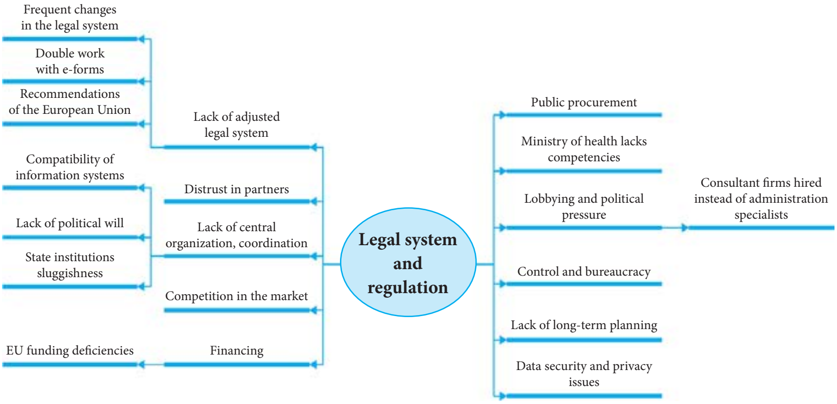

Figure 5.7. The structure of analysis of the problematic content in the area of e-health legal framework and regulation

Speaking of peculiarities of the development strategy of the e-health system, the respondents pointed out that the reasons for the system development, at least in the past, were driven by a lack of strategic thinking, changes in the political power and the related changes in the implementation of the started works. There were also problems mentioned, which are associated with too much outreaching plans without a proper evaluation of the situation and possibilities, leaving the implementation of strategic processes for self-development, without appointing responsible institutions and persons. Much loss was generated as well as difficulties for the future were caused by the fact that there was no systematic approach to the existing and/or developed IS at the healthcare institutions, there were no timely measures foreseen for their integration, and the delayed legal regulation determined that healthcare institutions created and implemented e-health systems according to their needs, without the guidelines of how they would be developed in the future and what final result is expected at the national level (**Table 5.18**).

At the primary stage of the development of the e-health system there were considerations that the system is just a part of the software, but it was not perceived that in order to develop an IS, the stages of planning and design must be well developed. The attention was focused on the converting forms to the electronic format, but there was no agreement of what links, what bans, there was no foundation on which it would be possible to continue development of IS, capable of communicating with each other. As a result, the works, started at the initial stage of the development of e-health, without the expected result have led to judicial proceedings. In these uncertain conditions, there were many local systems developed, which later on received a lot of attention for integration and which requires a lot of resources.

However, the respondents acknowledge that the e-health policy has greatly freshened. The healthcare institutions see the direction of the e-health system development, following sufficiently clear guidelines; financing, though not always sufficient, has also been provided. It is important that the developing systems have already one of the requirements established – have the capability to integrate with other IS. Healthcare institutions hope that eventually the MoH will create a core for the programmes "to communicate". At the same time, attention is drawn to the need for a strong coordination, political support to ensure the continuation of the strategy implementation. However, it is still being observed until now, especially in the remote healthcare institutions, that too outreaching plans without securing a clear, strong, coordinated their implementation process, without proper consideration of local problems as well as the lack of a continuous political support remain the significant risk factors for the development of e-health.

Table 5.18. Attitudes of the respondents toward the problems in long-term planning

Generalised attitude	Confirming statements
Lack of strategic thinking	17-L-P. Before that they were trying to drop from the centre without looking at what's below. Now they allow the 'bottom' working. Now they are trying to build from the bottom. And now if there is a methodological support, there will be growth. Because you see, now there is someone to demand when the Ministry itself does not do it. When they were doing it themselves, they were not completing it. 27-L-A. The absence of the general strategy, the certain dominance of some local projects in Lithuania, and indecisiveness in terms of what to do next is actually the main problem. 60-IT-P. I would say that there is no overall picture from the top. I would say that this should be done by the Ministry, which should provide the overall picture because it seems to me that no one even sees it. 8-L-A. A created national level core is necessary, but in fact everything happens on the opposite – from the bottom up. The process began at the wrong end…

Generalised attitude	Confirming statements
Changes in political authority	27-L-A. I think that with every political authority we keep changing your wishes and needs, and the question is whose desires and needs and whose political will is that... But the question is how much it reflects the expectations of employees because it is a very simple truth that some people still cannot understand. 42-P-A. Then even this meeting is hopeless because someone has to feel himself in control. And is a certain horn of plenty passed on and I have it today, and someone else has it tomorrow, then with all the bright and attractive ideas I might have I won't realise any project ever <...> So here we have a certain mix of unrealised ideas, unfinished projects, money not fully allocated, and post-installation maintenance not considered. Because someone came, stayed for five years, and went away, tool a part of you together, replaced the people on top, and hired people from the back door
Plans that cover too much	33-Pr-IT. A wide variety of applications, a variety of platforms, much of integration is needed. Millions for the integration. And the government does not want to do anything. Because judging by what they do and how they do it, they don't want to have a result. I think their plans are too much utopian. But one needs to make baby steps. It is better to perform small functions, but the functions that are really needed. It is definite that too much money is spent. The money, in my opinion, for the most part, goes somewhere else. In reality, they do not really need what they create.
No people in charge	53-Pr-A. It is clear why e-health has damped in development. If there is some money allocated, but this money is laundered, so the money is gone, and there is no one in charge, and I quit the job <...> Just imagine, there were millions of litas allocated, the money is gone somewhere, and nothing has been done. People quitted their jobs, and there is no one guilty. 11-P-A. This vision seems to me double-edged... A centralised e-health project has already been started in Lithuania, but then everything just died and several millions of litas went to waste. So they talked if they need to punish the guilty, but people were left unpunished because the first project was the one to create the national system. I don't know how many of those millions were allocated, but nothing was created, there was the idea, there were no workers. So now we have to try again? The bottom line is maybe the state is disabled; there should be groups, which would think about how to introduce new modules when there is money allocated and the regions would be guided by that. But now we are doing something as we see it right.

Generalised attitude	Confirming statements
IS interoperability	25-L-A. Nationally there is no common system in place. There are separate functionalities and separate functions introduced. But everything got under way just now <...> It all depends on whether the technical personnel will be able to implement the integration. How the regions will react. <...> There is still to this day institutions, which were not included in the process and which will not be covered and included in this e-health system and then automatically, you see, this will not be a hundred percent job. This model is already clear now. 26-L-IT. We are completely bare, naked, and we are in a very favourable position because we have not really created any systems until now, so in the sense we refer to no experience so far. 27-L-A. All those things just "don't come together" for me here. And the integration processes... a lot of problems arise here, too. First, you create many things, then, when it comes to integrating them; you pay as much money again to have them integrated. 60-IT-P. When each of us was creating for himself, then each got what he had created.
Delayed legal regulation	23-L-A. The problem in e-health is that when there are systems already created, the requirements are set only afterwards. 25-L-A. Reforms in the legal framework should have been completed before the projects begin. Only based on both the national and the regional platform these projects had to be implemented, the systems had to be created and later improved again. 26-L-IT. I think as soon as legal regulation appeared, it became possible because until then everything was done only according to the principle "well, let's make the system and then see how to legalise it."

When talking about the legal framework the respondents remembered the previous e-health creation stages, especially when there was a lack of legislation to regulate e-health IS creation. So now, even if e-health projects are implemented very well, but the legal framework is not properly regulated, their effectiveness will be limited. Currently, most of the respondents are satisfied with legal regulation of e-health processes, although in some cases some provisions on the implementation of procedures are lacking. However, healthcare institutions represented by some of the respondents faced the drawbacks of legal provisions when taking them to practice (**Table 5.19**).

Changes in legislation are a natural expression of the development. However, in the creation of IS, such instability often leads to additional costs for the adaptation of the elements already created or to an unclear description of what is to be used now as a reference. In addition, Lithuanian legal framework governing any area is treating the European Union recommendations in an overly strict manner, leaving no the chances for the systems' developers to rationally choose whether or not it is appropriate to realise literally such recommendations. The respondents see a problem in double work with electronic and paper forms when the system has been developed, but the users also have to fill in paper forms to comply with legislative provisions. Some of the respondents see the realisation of private business interests in such provisions.

Table 5.19. Attitudes of the Respondents toward the Lack of Regulated Legal Framework

Generalised attitude	Confirming statements
Instability, frequent changes in the legal framework	40-IT-P. Regarding the requirements I also can tell you one such requirement stating that "it needs to be kept in mind that you may need to create or develop some sort of a new system and make changes to the system in accordance with the draft legislation." Which means that such change has not been yet legitimised… in law, but it has to be realised. There is a very high probability that at the last moment before it is signed, the minister or someone else will sign another change different to what we have almost created. 41-IT-P. If you look according to our experience and the stability of the legal framework, in principle, it is also not so stable. These changes are on the part of the customers. It is never the case that the things we agreed on and defined do not change. Thus, these changes usually increase the costs. It is like in a construction sector.
European Union recommendations	41-IT-P This is probably valid not only for the domain of e-health. It is related more to the European Union regulation. Here, however, is such a probably general problem that, in Lithuania, the EUROPEAN UNION recommendations are perceived as directives. Even, for example, the tender specifications for the creation of information systems specify a directive-type requirement to comply with standards, but if you read the standards, your see these are recommendations only.

Generalised attitude	Confirming statements
Double work with electronic and paper forms	49-R-VT. We just choose the necessary form in the information system, fill it in, print it, sign it and archive it. So where is e-health? And how do we send the document? We scan it signed and send it <...> Perhaps, more of a hybrid or a transitional stage of e-health. 48-R-VT. What is the cost of those paper forms? This is huge money. Institutions are calling me, complaining, so we were ordered to make one more registration log. I can say that we spend about 100 thousand LTL for toners and about 60 thousand LTL for the forms. This, of course, saving, it really will be. If we refuse at least part of the paper forms, it still will be saving <...> Both time and money saving.

When talking about the implementation of e-health strategic documents, the respondents mentioned that although the current e-health priorities are appropriate, the bureaucratic mechanism for the establishment of such priorities destroys the entire process (**Table 5.20**). The biggest problem is the coordination of documentation. Until the documents are coordinated, the purchase cannot be completed. The respondents remembered the cases where the project's time schedule has been upset because of numerous and lengthy procedures for the coordination of e-health system's documents. In addition, they emphasised a clumsy health control mechanism, which requires a lot of work. According to the respondents, such control procedures requiring a lot of resources are an expression of distrust in health system institutions leading to waste of time, which should be spent on patients. This leads to the quality of services decreasing.

Having faced with the negative experience in working with the control authorities, the respondents have suggested increasing the exchange of information on the problems arising from project implementation and their solution methods. It is expected that the Ministry could pass such information to other healthcare institutions to avoid repeating the mistakes.

Table 5.20. Attitude of the respondents toward bureaucratic mechanisms and coordination of documents

Generalised attitude	Confirming statements
Control mechanism requires a lot of work	11-P-A. The Patient Fund gives money through control. There is an amount of money to survive. We constantly have to work and prove that we provide services. The Fund checks whether the services were provided well. And we fight to receive the entire amount, which was designated for us. The mechanism for payments causes a lot of work, but I there was trust, no one needed all this paperwork. They would just allocate certain amount allow us using it. All of this reduces the quality of service and affects the patients negatively as less time is devoted to him <...> It would be great if computerisation serves us. But only control has improved.
Long process of coordination of provisions	48-R-VT. No,, the Ministry is not regulating. I would not say that it regulates the system much. Just the opposite it turned out that they do not know who does what. They only review the regulations but do not regulate anything. The process of coordination of provisions is actually very complicated. See, when you have coordinated with everyone, then one person replaces only one word, first asks to coordinate unofficially. And then, on the last day, after you wait and waiting, they change something. We already had that lesson. It seems like we have agreed on everything and everything was good. But if a person quits his job, we need to coordinate everything all over again. 25-L-A. If somewhere some employee, who works as a cashier or somewhere else, got stuck and angry because a certain sentence is formulated in the wrong manner, the regulations again are negotiated and coordinated because of that one little sentence, although it has no practical meaning at all. As a result, you see, because of that one little sentence now you have to work another year. 27-L-A There are plenty of companies, plenty of those who control, but there are no one really implementing. Just pointing fingers… Just see all the coordination paper they send… It's a hell of a bunch of all those companies and authorities like IPVA (Innovative projects development agency, UAB, TN) IVPK (Information Society Development Committee under the Ministry of Transport and Communications, TN), (IVPT) public procurement, and others. Everyone has the right to say something, some sort of opinion... And the most interesting thing is that this is just one of the employees, who expresses her opinion <...> There are a lot of those who control. We have attracted these structural funds to our cost, but it's a very complicated process over there.

Generalised attitude	Confirming statements
Too strict and too detailed requirements for IS	36-IT-D. These "tricky jokes" on the part of the Ministry happen from time to time. They are now intensively regulating the IS creation, the work, the programming document, which is talked about. So again we can go back to the stage of analysis, i.e. when the documentation was signed, what their platform they will create will look like. As far as I know, there is not even a winner, but he will create that system some day and it already described how it will look like. "It will not be like this… This cannot be like that. It will look similar, but not like this!"

The interrelated problems mentioned above by the respondents as indolence of the state institutions, lack of political will, the limited influence of the Ministry of Health, lack of capabilities and competencies of the Ministry of Health and gaps in coordination can also be seen as problems in the integrated e-health strategic development and legal regulation of its realisation (**Table 5.21**).

The respondents would like to see more specific steps suggesting that the political leadership of the Ministry is committed to ensuring a coherent and continuous implementation of e-health strategy. There should be an administrative apparatus formed, capable of listening to the needs of all the most important participants, assessing the situation, seeing the links and the big picture, providing the most appropriate means to achieve the objectives, and coordinating the actions of all the stakeholders. During the interview, it was mentioned that it was intended that the individual e-health IS would be created in a cohesive manner once IT companies distribute the design and installation of individual e-health elements to ensure the links between these elements. However, the realisation of such plans requires a large public project and there were no such actions in reality. Therefore, the progress in e-health area among healthcare institutions is greatly uneven. Some HI does not even have computer hardware; others have significantly improved their IS in the majority of processes of institution's activities.

When talking about the activities of the Ministry in the regulation of e-health system's development, the respondents suggested that there should be a stronger organisation with greater competence, which is a separate authority, or that the capacity of the Ministry in e-health field needs to be improved. However, smooth implementation and continuity of the Ministry's objectives in the domain of e-health is hindered by the political cycle of four, and sometimes even less, years. Therefore, a number of the respondents mentioned the need for a separate authority to administer the development of the national e-health system and coordinate activities of local healthcare institutions in this area.

Table 5.21. Attitudes of the respondents toward e-health management at the national level

Generalised attitude	Confirming statements
Indolence of state authorities	11-P-A. We should have more of such people from the Ministry, experienced ones so that the Work Group would operate in a centralised manner. I do not think there is anyone interested in e-health. Look at the Ministry's booklet… Analysis... it seems likes in progress, something is there, but nothing clear. 36-IT-D. The Ministry should appoint a 'listening', 'seeing' and 'evaluating' authority and the authority, which seeks to identify the links, rather than a commanding authority. I heard that maybe the Ministry would like to gather everyone for a meeting. But this has never been done so far. 60-IT-P. There is no overall picture from the top. I would say that this should be done by the Ministry, which should provide the overall picture because it seems to me that no one even sees it. One can go to an individual authority and see the IT and the systems they have there. Some authorities look like the darkest dark, others are fully 'advanced', with all kinds of applications and everything.
Lack of political will	42-P-A. You know, this is the same like in household. Maybe I want a enormous flat screen TV, but I just know the size of my salary and that I have different priorities. So the state is like a housewife and somehow needs to prioritise its financial resources. But you know, a strong political will is required, and it's not a secret that it is common to say that things will be fine and there will be enough money for everything, and then we will live as we live <...> We can, of course, try. But everyone has to realise that it costs money and you cannot take from the same pool, which is not full even now. 27-L-A. I think that with every political authority we keep changing your wishes and needs, and the question is whose desires and needs and whose political will is that. But the question is how much it reflects the expectations of employees because it is a very simple truth that some people still cannot understand.

Generalised attitude	Confirming statements
	33-Pr-IT. Millions for the integration. And the government does not want to do anything. Because judging by what they do and how they do it, they don't want to have a result. I think their plans are too much utopian. But one needs to make baby steps. It is better to perform small functions, but the functions that are really needed. It is definite that too much money is spent. The money, in my opinion, for the most part, goes somewhere else. In reality, they do not really need what they create.
Limited influence of the Ministry of Health	60-IT-P. As far as I know from the institutions themselves, they were facing those challenges, dragging on the part of both the Ministry and other relevant authorities because it is no secret that they all always conflict with each other. And I don't know what would stop this conflict. Maybe when the Ministry of Health is strong and authoritative... 36-IT-D. Lithuania has a historical tradition of the Ministry, in its turn, as you know, to change during every election, and sometimes even more often. Meanwhile, other institutions usually have the same people working on it for twenty years and more. So they have some very clear vision and the Ministry, which composition is changing every four years or more often, has almost no impact on them. They see their own way as they see its development and some of them are highly advanced.
The Ministry of Health has insufficient capacities and competence	49-R-VT. The Ministry is not limitless and does not always have the competence to implement projects. 36-IT-D. As to the competence of the Ministry in terms of IS development, it is a zero. Maybe it's an overly bold statement. But it happens so that no one coordinates the new requirements with IS developers. And no one is interested in how it will be realised. They declare that they would digitise everything and the minister signs some law or order, which in principle means making a huge step back. 60-IT-P. If the Ministry of Health had a higher level of IT, not only in legal terms but also in reality, and if the officials were the ones who saw the view from the top, if they were the strategists who saw the real situation and the things missing, who avoided the duplication and repetition and who coordinated those projects, then we would have a success. For now, everyone tries to grab the biggest piece of the pie, which leads to a continuous competition, division of areas of influence and no vision from the top. So, the Ministry has to put the puzzle together.

Generalised attitude	Confirming statements
	27-L-A. Too few people are working. Well, to see how much of them work just calculate. Open the website and see how many of them in the ministries are working on the e-health project. Well, how much? It used to be a excellent model. They say that it was illegal, but it's really not my problem. There used to be a health project office that was implementing all the public procurement procedures. The office located in Vilnius, with CPVA (Public Institution Central Project Management Agency, TN) near and VPK (Vilnius County Police Headquarters, TN) near, with a lawyer, three lawyers who are engaged in public procurement <...> This was a really good structure as they were engaged in nothing else.
The need for a coordinator	23-L-A. Coordination is required. When a public authority designs any program (like in the case of SveiDra of the National Health Insurance Fund), it should gather information on which authority has what, and only then begin creating the system <...> Maybe there should be a requirement stating that in order to create some sort of IS it should be coordinated with the Ministry of Health to get its permission. Having the general information about the programmes existing in Lithuania, the Ministry of Health would just be instructing which programme has already been created (or would give this programme). 51-L-A. It would be ideal if the Ministry said "just take it and use it." Would not it be better if the state would found an IT company, which would serve everyone? If the Ministry of Health understands and forms such an agency with appropriate salaries. Nevertheless, the Ministry cannot do things like that. And there will not be salaries like that. To found a public institution, you need to announce a public tender. It's like a vicious circle...

During the interview, the respondents representing IT companies were most often mentioning the specificities of e-health market and of the interest of operation on this market (**Table 5.22**). In their view, the national level e-health system is the zone of significant interests and influence, which, by the way, is formed not by IT companies operating in the market, but in the domain of state authorities. This is demonstrated by such trends as unwillingness to cooperate, constant change of requirements or delay in making the necessary decisions, allocation of resources to someone else's projects, the motives to hire consulting companies, which are not always clear. Some of the respondents believe that suitable IS offers are rejected because of political orders, but they also do not deny unfair competitive struggle among IT companies.

Table 5.22. Attitude of the respondents toward influence of interests on e-health development

Generalised attitude	Confirming statements
Competition on the market	50-R-VT. We have no other choice. We always buy on the basis of economic efficiency. Because the public procurement procedures is appealed against. Even then it is worth for another company to go to court for the competitor not receiving the planned revenue. They know they would lose, but it is even better if the competitors don't get profit. But as for us, every process stops. 37-IT-D. It is a specific competition. Nobody really controls what you have or what you can. There are many competitors, but they offer different things. At least in the business sector, we were the ones who laid the grounds... so we have high quality and fast installation as our main focus, which in the public sector is not an advantage. Somehow nowadays it is not very important for them, but it is very important for business customers.
Political decisions arrest the implementation of high-quality projects.	26-L-IT. In fact, the market in our country is very politically motivated and I cannot hide that it disappoints me. However, there is a very high pressure on the part of the managers or their party members or, say, previous partners. 27-L-A. I think that with every political authority we keep changing your wishes and needs, and the question is whose desires and needs and whose political will is that.
Impact of private interests on the planning and procurement processes	36-IT-D. In order to replace the document, the minister just needs to write a few words and he may not even understand what he had done. There are people who are engaged in things and I think that they do it knowingly. 59-Pr-A. Private interests took the lead at the first stage. Not the interests of individuals... I do not believe that even now any company can have a transparent winning. I also do not believe in quality as quality is always overpaid because it is always someone else needs to be paid for it. Thus, there is not balance in the concept of value for the price. This is not the case in official tenders that the best product wins. 7-P-M. Prescription books are a private business for a publishing house. It is an order. It is huge money. With watermarks. The paper is expensive. Fifty pages, fifty litas.

In terms of security, the respondents mentioned that this e-health element it is imperative, though difficult to realise (**Table 5.23**). According to them, cyberspace has to be very well protected and have a lot of means to adjust the level of security. Yet, it is also a controversial and confusing area. There is no doubt that it is important to ensure personal data protection and privacy in IS systems. However, when it comes to the classification of case history, IS has excessively high requirements set for it compared with security of case histories stored currently, when patients' paper records are kept at reception, placed in a cabinet with availability practically possible for everyone. On the other hand, the data on electronic media lasts longer and is considered to be safer than the data stored in hard copies. It is also difficult to evaluate the classification of personal code use because the personal code is confidential information and this complicates the identification of patients. According to the respondents, data collection for research purposes is made difficult due to an overly strict regulation of confidentiality.

During the interview, the respondents were also talking about the regulatory gaps in data privacy and protection caused by unclear provisions for exchanging electronic documents, issuing them and approving their originality and so on. In some cases, even the technologies are too much outdated according to the existing legal provisions to ensure data security.

Some of the respondents have noted that despite the legal and technological measures applied for data security and privacy, not all IS users, especially doctors, observe the safety requirements (share passwords, leave a data file open, etc.). However, such practice is more common in healthcare institutions where doctors still have to fill in data from IS and where there is an insufficient number of computers.

Table 5.23. Attitude of the respondents toward the problems of ensuring data security and privacy

Generalised attitude	Confirming statements
The personal code is confidential information and this impedes identification of patients	26-L-IT. In fact, their purpose from the very beginning was for an open personal coding namely, in the sense that it will be used instead of all the other data. And now suddenly it has become a sacred cow. Here we have complaints coming one after another... I do not know how the state will regulate these things further on because in some cases it would be more reasonable to use that personal code. In other cases, you have to hide even it under your custom code which, you never know, might become a sacred cow too. 11-P-A. There was an order not to write personal codes due to the protection of personal data, but we cannot leave empty forms, which were approved, so maybe the first thing to do would be to correct those forms, the laws are in contradiction to each other. IT-36-D. What becomes out of everything – we cannot use the personal identification number. The law states that it is not allowed to disclose personal data. <...> What we did – we changed the system. Where there is a request to enter a password. You most probably have twenty passwords... If you are rarely going to a healthcare institution – you will forget it for sure. This is what I am talking about. Such requirements reduce the availability.
Too strict confidentiality regulations hinder scientific research	29-L-A. We are very proud of our register, which we have for registering children suffering from diabetes because not all, even the most developed countries, have this done already, now we want to participate in an international project in order to have our data available internationally, is an international registry, which not only records the data, but also observes the progress of the illness <...> it is a very important tool because everyone can use those results, you compare, analyse, various countries, compare the treatment methods, etc. Now it is not even called a register because it does not exist, cannot be, this is done only thanks to the enthusiasts, as it is close to being a criminal activity, just because of the protection of data, but it gives grounds for a lot of publications and scientific works. IT-40-P: I think that the option when anonymised data can be used for some scientific research, is good. But in general, there must be privacy respected.

Generalised attitude	Confirming statements
Not clear regulation	42-P-A. The question regarding security will be, like now with electronic documents... On paper everything is clear: signatures, you put a stamp, put it in, everything is secure. For example, we now have little clarity with electronic because if it is electronic and a person wants to take it – you can download it or print it, when it is printed it is no longer electronic and no longer original <...> As far as the security of data is concerned, let's say that sending by e-mail cannot be done just like sending to other institutions. So, all these kinds of security issues arise and what to do. I think everyone has very little clarity. 11-P-A. The issue of data protection is an open question, I smell commerce here, when you pay the money, then you get the access. If no payment, there is no access, but the arguments are that it is confidential, you cannot know about the other person. There is no safe national system so we can read the case summary, but we should decide who can do what. 25-L-A. The problem comes from the fact that at the launch of the projects implementation, the data protection legislation began to be modified. And if we had something created with the old version of documents now these particular documents have changed, it is the safety requirements. Why they were changed now when all the projects are executed in large amounts. Why could not they have been changed and the new provisions would have been incorporated in the currently prepared safety documents?
Data on the electronic media lasts longer and is considered to be safer	15-P-IT. Regarding data protection from my side – whether it is in the clouds or wherever it is of little importance. The main thing is that they can be restored. But morally it is safer when an external disc is standing here, and not somewhere there. 22-P-A. The cyberspace is very well protected and has a lot of levers to adjust the level of security. As you know, there is electronic banking, which is used for making money transactions. <...>The data is duplicated and stored in different places, so their disappearance potential is minimal. 36-IT-D. Another issue is that the level of a security moves into cyberspace and how much that environment will be safe. If you manage to enter there, you can do whatever you want. <...> But this is not a part of some kind of special attention from the criminal world. I do not think anyone would really abuse it. It is an easily achievable thing. But so far it has not been done.

Generalised attitude	Confirming statements
The technologies are outdated with regards to data security	27-L-A. The developed technologies by Lithuanians are clearly and unambiguously outdated, there are difficulties with security, difficulties with privacy, and there are issues so to say. I do not know, they all promise to do something, but so far only promises, but nothing has been done.

Respondents' opinions on the scope of e-health financing have diverged (**Table 5.24**). Healthcare institutions in the private sector develop all the IS at their own expenses. In the opinion of the management of these institutions, there is too much money allocated for developing systems of budgetary healthcare institutions. The state has too many utopian plans, which are financed with millions. It is better to move on consistently in designing the systems, introducing one functionality after another and only what is needed to facilitate the doctors' work. In the meantime, a large-scale systems are being created now, and there will be modules which will not be used extensively, so the funds for the system development will be employed inefficiently. Other respondents state that, according to the desired volume of the systems, the provided budget is too small. The healthcare institutions, implementing the projects, are worried, when during a public procurement, the estimates for the system development are revealed which are substantially exceeding the planned funds. Respondents from IT companies also agree that the volume of the planned systems costs much more than the funds available. Heads of the administration of the regional healthcare institutions mentioned a problem that after developing and implementing the e-health solutions with the EU support and the state budget, resources will be needed for the maintenance of the systems. However, healthcare institutions not have planned for it and see difficulties to allocate additional funds for the IS maintenance.

Table 5.24. Attitude of the respondents toward financing problems

Generalised attitude	Confirming statements
EU financing questions	32-R-VT. Well, if to talk about financing, financing of this entire development, there is certainly a better model that the state itself would be able to provide from the budget, then we are in control of the time. But when we are not in control of the time, but employ, for example, the European support. <...> Because we are provided with the money, it would be unwise not to use it. 49-R-VT. The success of all these projects is based on the European money. And, indeed, when it is said that we would not need money, then the green light is given. And when it comes to the money, they are not available.
No financing allocated to ensure the continuity of the projects	49-R-VT. It is said „it is for free, and it will cost this and that afterwards?". It will charge for the connection, for services, and the payment will be done by the patient, the institution. And who will give money to the institution? The Ministry? And who will give for the Ministry? So it will go on stumbling like this. We transfer this burden on a person, will be shared. The creation of a trifle. It will be more difficult later on. 48-R-VT. Once a system is created, it will require continuous maintenance: something has changed, altered; it needs to be put in order. It has to be alive. 11-P-A. Something has been overlooked here by the eMoH, not everywhere in the world it is done so complicated. The resources for that are also not available; we have to invest ourselves some money every year to the e-health. A reform without money generates nothing good, and the money of the projects is not always properly used. 23-L-A. Money is needed for the solution of the e-health problems, for the improvement of the situation. Because the resources are necessary not only for creating a program but also for the equipment. Moreover, a team of IT professionals is needed in order to support programs well. Regarding the ability of the medical personnel to work with IS, at the recruitment it is already included in the requirements to have skills for working with certain programs.
Financing of IS with regards to the public interests	42-P-A. If someone from the Ministry dared to say in public that, you know, we have a million, and we‘ll have next year, but still out of this million, for example, two hundred thousand now will be allocated for implementation of the information system. So, dear patients, for you to pay for direct payment services there will remain eight hundred thousand. I do not think we will have any approval from the society.

Generalised attitude	Confirming statements
Uncontrolled, inadequate public financing	49-R-VT. Everyone says that it is not nice to say that the problem is money, but I think that, in this case, it is really the cornerstone. With regards to the national level, there amounts of money are huge. But, if you asked me whether I knew what was being done at the national level, I do not know what they are doing. I know the fragments when I am invited somewhere. <...> Here is the problem. There is a lot of money allocated. When you take a look at what has been done, you come to think that it is not the matter of money. 33-Pr-IT. A private institution has to purchase medical equipment also by itself. The public health sector is an example of how millions are wasted, when systems are developed, which are not really functioning later on.

One more group of topical problems, mentioned by all the respondents, with the exception of representatives of the medical personnel, within the area of legal regulation of e-health is the public procurement problems (**Table 5.25**). Linking with the previously discussed challenges of the interests influence on the development of e-health, the interlocutors shared their experience when procurement was stopped for the reasons, which were not always clear. According to the respondents, the criterion of the lowest price, used in public procurements, potentially hinders the quality of the projects, and when the procurement of services is done in accordance with the criterion of economic efficiency, we face the unfair competition of IT companies, when the procurement results are claimed. This causes the procurement procedures to be prolonged, and that disturbs time schedules of the e-health projects. In cases when several public procurements are launched due to the development of a more complex system when some issues interfere with one procurement process, the other related projects cannot be implemented either. As far as technical specifications for public procurement are concerned, there were no many unambiguous approaches. Some respondents emphasised that IS developers and implementers require too specific technical specifications. However, they realise that it is natural for IT companies to need a clear understanding of what product they have to provide to the customer. Other respondents vice versa; they wondered why the requirements were formulated in an indefinite enough manner to give grounds for the procurement procedures to be prolonged. Still, the respondents, especially representatives from IT companies, considered that a certain level of indefiniteness in requirements should be maintained because it would give the opportunity for the customers and IS development service companies to work together in finding the best mutually acceptable solutions. In addition, it is understood that while the system is not started to be created, and there is no possibility to ascertain whether it meets expectations, it is very difficult to predict and to describe accurately the system's requirements. If there is no space left for flexible solutions and if during the process of IS development or implementation some shortages are revealed, it is very difficult to actualise better solutions without violating provisions of the strict legislation.

Table 5.25. Attitude of the respondents toward problems of public procurement

Generalised attitude	Confirming statements
Procurement is stopped due to the reasons, which are not always clear	26-L-IT. Well, the time limits are destroyed by public procurement, something has not met the requirements, somebody has stopped, and something has to be started again. You send somewhere; you do something again... You have to wait for fifteen days; you did that again and again you have to wait for fifteen days, you know. So, these things kill. The public procurement summary, what we all are going to purchased here is a huge problem. 42-P-A. Again public procurement, this is namely where I am out of control. <...> Here we have the element of success coming up also. A large element of luck, where everybody can poke his finger on this element of success, and in two years to say, you know, there has been a breach of competition. And again in the tender is on...
The project quality is impeded by the usage of the lowest price criteria in public procurement	50-R-VT. I had a chance to meet the developers, their approach is equally the same, it is necessary to check what is written in the terms, and that's it. <...> It is not the people to be blamed, it is the public procurement fault when we want for the minimum money to have whatever is possible. Who wins... the cheapest. But today you can carry out public procurement in other ways. But the institutions themselves are to blame. You can execute public procurement in other ways not only for the lowest price. But due to a number of reasons, the selection falls on the lowest price, and then it causes you problems.

Generalised attitude	Confirming statements
	26-L-IT. This does not mean that it is possible to select what is the very best, however, because in one way or another it is based on the price. And everything is far from being cheap and good. Not in all cases it is like this, we live somehow in a little bit different way, we look for the rational solution, and here it is practically impossible. Of course, there is room for criticism here, the economic evaluation...
The implementers require too concrete technical specifications	48-R-VT. From the implementers' side, it is a business. If they do not specific tasks provided, why should they do it. Another question is why the formulation is so sketchy that afterwards they do not know themselves what they are ordering. Of course, information systems are so complex that it is impossible to control everything.
Public procurement intervenes with the implementation of related projects and creation of the coherences	IT-60-P. Both procurements were announced at the same time, but the ePrescription is a subsystem of the health service and communication infrastructure, it‘s good if the same supplier wins. But the tender was awarded not to the same, as far as I know. The health service and communication infrastructure is the main system. Just imagine, a public procurement is ongoing. As usual all kinds of claims and complaints, but having been tendered at the times, they will not necessarily enter into contracts at the same time and start their execution. There may be complain about the results, may complain still in the course of the process until handing over. Usually, this is what happens in Lithuania... So to have the illusion that they will start at the same time. <...> is absolutely naive. If they start at different times among each other, again it is not clear which one goes first. It means that again they interfere with each other‘s work.

5.3.2. Participation, Cooperation, and Communication Issues among the Stakeholders of the e-health

While conducting a qualitative analysis of the interview part concerning the e-health system participant cooperation and communication, it became apparent that that the respondents face actual problems in relating to and between all e-health participant groups: governmental institutions, external IT companies, and healthcare institutions. **Figure 5.8** demonstrates the structure of analysed problem clusters.

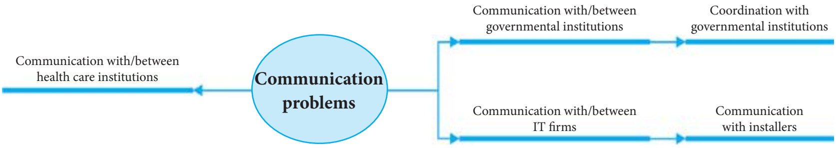

Figure 5.8. The structure of the content analysis of problems in e-health system cooperation and communication

One of the problems that were named in the interviews was a lack of horizontal and vertical communication among all stakeholders. Most of the respondents mentioned the challenges arising out of communication and cooperation issues with and among governmental institutions (**Table 5.26**).

One of the problems why the national e-health project is late in coming is its size and complexity. It points to the need to ensure effective communication among the many different participants: the Ministry of Health, health services institutions and individual participants within them (managers, doctors, nurses, patients, administration, IT specialists etc.), other governmental institutions, IT companies and other stakeholders. According to the respondents, it would be a misleading way to create the system if the decisions were made without taking into consideration the experience and the interests of the e-health participants and by giving directions on how something ought to be done instead. This is particularly relevant to those healthcare institutions that already have an e-health information system in place and who had to do double work in order to move from the local to the centralised information system. Thus, the respondents emphasised that the governmental institutions should clarify the situation regarding the already existing systems and seek ways to install technological solutions at the national level that would be as smooth as possible and at the same time making good use of healthcare institutions' resources. Both healthcare institutions and external IT company representatives raised the question whether it was possible to make it so that the systems cooperate and would not require a great investment of human resources. According to them, these problems need to be solved at the national level. According to some respondents, such solutions are possible when there is a will to implement them, yet there has never been an effort by the government institutions to find the unifying solutions. IT company representatives expressed concern that the "position of the ministry is very strange" and raises suspicions, whether it truly seeks to achieve the publicly stated results.

The respondents when speaking about the problems in the e-health system installation process remembered the previous stage of creating the e-health system and compared the two. In their opinion, previously the decisions were made at the national level in a centralised way and did not consider the institutional level sufficiently. Now the attempts are made to create the system from the bottom up. According to the respondents, in order to achieve the results working from the "bottom up," a strong methodological support and coordination from the ministry is needed. Yet some of the respondents were fairly critical of such work methods. They perceive that one needs a company foundation first, and then individual pieces can be added to it. Otherwise, the current e-health design process cannot be called a system; rather it only creates subsystems that need to be connected to a single system. This way there is a threat of subsystem incompatibility and incongruity between central modules and individual institutions.

The responses regarding civil servants as stakeholders were varied. Some respondents claim that civil servants are some of the key stakeholders' however waiting for their decisions takes too much time. There are some very positive responses about the civil servants working at the Ministry of Health as well.

Some respondents, especially those the representatives from healthcare institutions that are implementing governmentally or from EU funds financed projects mentioned procedural obstacles arising out of bureaucratic mechanisms as one of the key problems in cooperating and communicating with governmental institutions. According to them, the installation of e-health at the national level does not happen smoothly because of irrational and inflexible and overly bureaucratic procedures and correspondence. Some of the interlocutors said that the relationship with the ministry and other governmental institutions is important, but with time they got disillusioned with the communication with the ministry due to lack of inclusion, inadequate assessment and coordination of healthcare institutions' interests, ignoring of initiatives and shortsighted and inflexible application of formal requirements. There were some very critical opinions expressed in the interviews regarding the ministry personnel's competencies in e-health field; however the respondents objectively evaluate that for the proper management of this field at the national level many more specialists in e-health field are needed than are currently available. Some of the respondents expressed the opinion that the Ministry of Health should not be concerned with the information system installation management but rather create the politics of this field. It is natural then that ministry's e-health department is unable to control the current situation, including the inclusion of the stakeholders and ensuring of cooperation. Yet there were several positive responses about the work with the representatives of ministry; it was said that they try to seek constructive solutions that would be acceptable to all e-health participants as much as the circumstances allow and that they consulted the specialists who have the expertise that the ministry personnel lacks.

Table 5.26. Respondents' attitude toward communication with or among governmental organisations

Generalised attitude	Confirming statements
Poorly defined concept of e-health creates obstacles in communication	48-R-VT. Let‘s agree on the definitions. What are we talking about? Are we talking about e-health that the ministry is creating or about e-health in its broadest sense, that is all information technologies that are included in the healthcare system? These are two different things. Why do I think these concepts need to be defined as separate? Because as of today the situation is such that there is only non-communication and miscommunication. I will tell you how these systems, any systems are created. Somebody comes to me; we talk for an hour once, and that‘s it. They are specialists; I do not see them anymore. I doubt if you can learn everything in one hour. Better yet: I talk to the ministry. They say they are working on death certificates. We say, wait, what‘s going on. No response. We do not know who is a part of this; we don't understand what‘s going on.
The advantage of being independent of the ministry	56-Pr-M: When it comes to us, a private healthcare institution, we have a more stable system, and we do not face many issues. Because we receive no financing from the ministry, they require fewer reports. Here we have no problems. We really do not have to create additional documents because of their requirements; that‘s for sure.

Generalised attitude	Confirming statements
The consistent inclusion of stakeholders is not ensured	53-Pr-A. We do not have the project from the ministry. We do not participate in this project. I have participated in this project‘s work groups. Also our IT specialist, X, has been there. As a doctor, I have been to several meetings at the ministry. <…> We tried to explain that the realities are not reflected in this project. How does one ensure that the doctor consults a patient, how does one receive this data. At that time, there were very many gaps in the project. There was one general law, and then that second one, about which nobody consulted anyone, nobody invited anyone, and we were simply kicked out. Our IT specialists were not invited either.
Inflexible requirements	11-P-A. I have tried discussing a contract, but the response was that the contract is universally applied in all Lithuania, and we have to fulfil its requirements precisely. The end of the discussion.
The distance between the ministry and the healthcare institutions	19-L-M. Can the ministry play any significant role in the processes that are happening in the hospitals? I see no connections between the two, even though there should be some.
Lack of information when implementing innovations	20-P-A. Some kind of system emerges. At least the health insurance fund or their regional department could have said that a new system is implemented, a system with algorithmic schemes, that there is contract that is signed, that they are restructuring or renovating. But we did not know a thing. As I understood, we started doing this project without even knowing it.
Governmental institutions suppress initiatives	24-L-IT. We participate, but our initiative is not received well. If we call and suggest something, they show no interest and reject your idea: “If we need you, we will call and ask you.” I have only sporadic contact with them, nothing big. Each work needs to be evaluated based on whether it achieves its goals; it should not be a process for process‘s sake.
The importance of stakeholders‘ meetings at the ministry	3-L-A. Is the relationship with the Ministry of Health important? I care about implementing the original idea, about the quality of interconnectedness in the system, about being able to shift between institutions in the system. I do not need all the records, but I want to know the main things <…> We had a meeting at the ministry about that. <…> The ministry asked questions; we felt heard, and it was a good work meeting.

Generalised attitude	Confirming statements
The ministry does not manage information well	48-R-VT. No,, the ministry does not regulate the details about the information system. I would not say they regulate the system. On the contrary, everything is fuzzy; they do not know themselves who does what.
Prolonged process of receiving required documentation that obstructs other processes and procedures in public institutions	51-L-A. The coordination process is really very complicated, good God, it is. You work it out with everyone but one person changes a single word. Initially they ask to coordinate the whole thing unofficially, and then you keep on waiting and waiting and on the last day they change something. We have learned our lessons. It seems that you have reached an agreement with everyone, everything is fine. But if the person leaves their job, you have to start the process anew.
	48-R-VT. This whole different question how the regulations are processed by the ministry. It is a catastrophe of its own.
	25-L-A. I did not receive a response for a month; I got no answer – this happened to me personally. I got only stuck in this X institution. I called them, found the person through their internal contacts and inquired. I say, “What happened, why don‘t we receive anything, this is what we are dealing with, we want to move ahead,” Because without their agreement we could not make the purchases for installation. <…> That‘s it, they said, we have many documents, we are working on it, you will receive it next week. Well, OK, I calmed down, put down the phone. So a month and a half later, right? After a month, I called them. It was two and a half months before we received anything...

The respondents’ opinions about the cooperation between institutions in e-health field are highly varied (**Table 5.27**). Some respondents mentioned that they only know some healthcare institutions that are advanced in their use of e-health, but they have not participated in any events dedicated to creating e-health they do not seek cooperation with the staff of other institutions when it comes to e-health. Another category of respondents is specialists who when they lack knowledge contact other healthcare institutions using their personal connections. Those respondents who are healthcare institutions actively creating and installing e-health information system claim that it would be useful to have events where they could learn about the already existing systems and discuss the problems in creating and operating e-health systems. Some respondents from the healthcare institutions who are implementing shared projects with other healthcare institutions claim that cooperation across institutions happens only when projects are implemented. Yet even among project partners, honesty, clarity and transparency of interests is not always upheld.

According to the respondents such contemporary e-health system challenges as a variety of platforms, their congruence and problems with integrating already existing systems are caused by lack of synergy between stakeholders. Some respondents from regional healthcare institutions that are not as advanced in e-health feel demotivated by previous failures in designing e-health and lack information about projects that are implemented now. According to some respondents, when there is no active cooperation between healthcare institutions and healthcare institutions and national strangulate bodies, e-health solutions are created and implemented according to the subjective understanding of each healthcare institution and their computer literacy and project management competence level. This way individually written computer programs appear and they require a lot of funding in order to renovate and integrate them. Yet when different systems are integrated and corresponding institutions that are responsible for operating these systems (e.g., social insurance, national health insurance fund, Centre of Registers, etc.), the documentation approval process for the healthcare institutions became very complex and prolonged. When it comes to this aspect, many respondents miss seeing benevolent cooperation and effective communication

Table 5.27. Respondents' perception of communication between or with healthcare institutions

Generalised attitude	Confirming statements
Insufficient participation and support in creating IS from the top managers of healthcare institutions	36-IT-D. I tell you, it happens that the boss sits. Truth be told, it surprises me... The top managers are not interested in the systems. They want to have them, but when it comes to what and how it will function... We come with presentations, and the top manager comes like some Santa Claus. He stays for about 5 minutes and leaves. It‘s like, my job is done here, and I stayed for a little while, paid my respects, but what you will do here and what you will install, I do not care. And the way it plays out is that often times it seems that the person who talks to you does not even know the process from the beginning to the end.

Generalised attitude	Confirming statements
The need to share experiences among healthcare institutions	1-P-A. We cooperate with other healthcare institutions mostly through projects. We probably should communicate with others regarding e-health, there was a product presentation organised by the health committee. It would be useful, I think, to share who has done what. We need some independent gatherings.
Healthcare institutions in charge of shared projects ignore their partners	11-P-A. The project is happening somewhere far away from us. However much X gives, this is how much money we have. First of all, I think, they will take care of themselves if they have such a right as coordinators; but maybe we will receive computers; there will surely be no money left for digital medical records. 20-P-A. Our IT specialist had gone there, but there is no sense that we will receive something. We send people to work groups, but nobody asks us. These work groups are obligatory, but we do not go there because there is not much constructive that happens there, to my mind.
Shared information systems influence cooperation between healthcare institutions	5-P-A. Nothing gets in the way. Money does. I cannot buy this product and install it at my place. I will buy it from x and work with X. But how will I communicate, say, with Mr. Y, with clinics where my patients are and what, will we wait for medical records for two months? The programs are different.
Lack of trust in regional partners and their devaluation	13-L-A. There regional partners... they are kind of weak. Their main question is when they will have computers. <…> And they have nothing of their own. I feel responsibility and fear that when it all starts and something go wrong, everyone will start calling, not just our people. 27-L-A. Not counting us... there is a project with 18 partners but nobody really needed it, and I did not offer very hard. I don’t know, I don’t think I am some expert, but we have our own methodology for this, shall we say, installation. We have mastered it, and now we are performing much better in other areas.
Lack of communication among project partners	5-P-A. I am telling you that a problem with this project and all others – is that there is not enough communication.

Generalised attitude	Confirming statements
The necessity for all healthcare institutions to cooperate and commit to filling out data in IS	60-IT-D. EHealth is such a thing where all the data, well, if each institution does not bring in their input into the system, it‘s not going to work, it will be incomplete, meaning we will need to look for data somewhere else, additionally. Maybe this is the kind of system that is unlike others. <…> This has to be full cooperation. And this cooperation, as it always happens, is blocked in Lithuania, as if to show that that which I have and that which I do is better than what you are planning to do and I can prove it by destroying your project, that is, by not cooperating. These things do happen. 8-L-A. Do we cooperate with other hospitals? Of course, there are our competitors. It all depends on contacts and relationships. All ten national hospitals matter.

When speaking about communication with IT companies that design and install e-health information systems, healthcare institution representatives among the respondents mentioned that it is necessary to maintain continuous communication from the explanation of needs to the installers to the very end of contractual relationship (**Table 5.28**). The respondents also emphasised that at the same time it is important to maintain communication with the internal healthcare institution stakeholders in order to clarify all their needs and to detect problems with the information systems of time. For this to happen, the representatives from each of the future user groups need to periodically assess the elements of the product that is being designed and/or installed using such criteria as the completeness of data, precision and ease of use. Suggestions and needs then are to be discussed with the installers, who proceed to assess whether these needs can be met. Despite the potential difficulties that can arise with programming, the main goal is to work until the technological solutions satisfy the needs of the people who will have to use the information system every day. The experiences of communication with external IT companies vary among the respondents. Some of them express disappointment that the installers function only according to contractually defined relationships and that IT companies use clients' lack of competence in articulating their needs as an opportunity to increase their profits. Other respondents, on the contrary, feel their continued support when problems arise and their desire to meet the clients' needs. On the other hand, disappointment regarding the fact that many companies do not know anything about healthcare system and do not want to learn about it but continue to offer basic products in hopes of quickly adapting them to the needs of e-health was expressed time and again in the interviews.

The representatives of IT companies when speaking of their relationship with other IT companies emphasised the dual nature of this cooperation. On one hand, all of the companies that work in the sector are competitors who seek to achieve their individual goals and in the process of procurement they obstruct the process of creating e-health system in order to realise these goals. On the other hand, when there is a need to install information systems at different healthcare institutions and there is an explicit requirement that the systems need to integrate with each other, the installers need to coordinate their actions. Yet in this case the question of cooperation becomes very sensitive, especially if there is a lack of cooperation from other stakeholders. Thus in the interviews the questions of communication among IT companies and with other e-health participants was named as one of the most immediate problem areas.

Table 5.28. Attitude of the respondents toward communication among and with IT companies

Generalised attitude	Confirming statements
The basis of installing IS is clear contractual terms and conditions	50-R-VT. Now all business subjects have learned to read the contracts literally ad if something is not done; it needs to be fixed. We have met some SPBI (healthcare and communication infrastructure) creators whose attitude is just like that: we need to see what the conditions say, and that is it. Do they seek the easiest way? No,, the requirements of IT company management are to do as much as possible for as little as possible. The IT professionals themselves are not at fault here.
Flexible cooperation when unforeseen circumstances arise	53-Pr-A. Well, how... everywhere you look it is a matter of contract. This is what I do for you; this is what you do for me. If we see that something is the mistake of the IT company or if it is a matter of them not having thought through it carefully, then we do not need these contractual matters. They correct their mistakes quickly, reprogram. For example, we see that we need yellow highlights in order to see better, so they solve this very quickly and change it. So yes, they respond.

Generalised attitude	Confirming statements
Lack of specific knowledge of healthcare system‘s needs among the IT companies	32-R-VT. Really there is not much choice. Let‘s put it this way: the IT sector has no clue whatsoever what e-health is. Their understanding is very foggy. Everyone things, “we will come in, install basic products that were created by someone else, shake hands and everyone will be happy.” In reality, this is not how it works.
The need to maintain continuous communication with the installers	54-Pr-A. In order for my staff to work well, they need to know the program. In order to know how to use the program well, someone needs to have a deep understanding of it. In order to understand it, you have to sit down and figure it all out yourself and take the installers along. You ask them about things that do not make sense, call them and keep on clarifying. After a while, you see that everything is much clearer. There are certain nuances that come up all the time. <…> I call them and ask them if I do not know something and they explain it to me or tell me how to do something.
The unsuitability of basic products for the specific industry	44-P-A. IT companies bring in a product from other countries and say they will adapt it. We have already had this kind of experience. 32-R-VT. We have had multiple experiences when they are absolutely unusable. The processes are different. Operations are different. Lithuania has tried this before, but nobody seems to have learned anything. New politicians come, and we start from the beginning.
The particularities of competition in the specific industry	36-IT-D. As a rule, we really do not share the experience. The know-how is ours. If somebody wants something, we are very open to integration. If somebody wants to combine products and in they have what we do not have, if the information about these things needs to be exchanged. 36-IT-D. But there is a need to communicate, and there is a need to compete. Nobody shares money in Lithuania, so all of the projects are somebody. And probably it is impossible to change it. You need to win the tender, and your friend becomes your competitor. Then the conversations become very complicated.
Client satisfaction is an important element in service quality	53-Pr-A. The IT company knows the program really well; they do the training for the new people. 3-L-A. We have a pretty good relationship with the installers because each installer wants their clients to be happy. 18-L-IT. Of course, the installers listen. Of course, they make no suggestions. If there is a problem, they help.

5.3.3. Internal problems of the organisations in planning the creation, implementation and development of the e-health measures

Internal problems of the organisations in planning the creation, implementation and development of the e-health systems were linked to the more generic systemic problems by the respondents during the interviews. But it is obvious that for the respondents outside the state level and the Healthcare institutions management groups, internal problems of the organisations are most topical. On the other hand, the leaders of state institutions as well as the representatives of external IT companies and heads of Healthcare institutions did not deny that many and various internal problems of Healthcare institutions can lead to the interference on the national level in the development of the e-health system. Thus, a comprehensive qualitative analysis of the problems in this area was conducted by grouping them into quite a lot of specific topics (**Figure 5.9**).

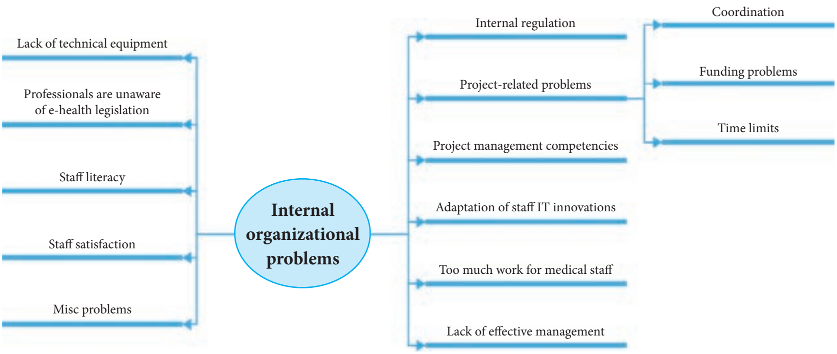

Figure 5.9. The structure of analysis of the internal problems in the organisations

The qualitative analysis of the interview leads to grouping of the problems, indicated by the respondents', into those relating to the staff (**Table 5.29**), resulting from ineffective management (see **Table 5.30**), project management problems (**Table 5.31**) and internal strategic management problems (**Table 5.32**).

According to the respondents, in developing and implementing the various elements or modules in e-health projects the involved ones are: doctors, nurses, statisticians, receptionist, IT professionals, programmers, testers, patients, administration, installers, and civil servants. All the stages should involve specialists from the widest range possible of the different fields. However, the Healthcare institutions administrators, IT professionals, civil servants mentioned during the interview that when creating and installing e-health solutions they face bigger or smaller problems of (self) involvement in a variety of stakeholders at the various stages. The problems related to the staff involvement and participation, from the respondents' point of view, are influenced by a natural negative reaction of people to innovations, attitude to continuous changes, by a limited computer literacy etc., and this causes the resistance of staff in the process of development and implementation of the e-health IS.

The interviews with the representatives from hospitals and clinics revealed that the most difficult task is to involve doctors in the development of IS. The respondents emphasised that a cautious and sometimes at the beginning even hostile attitude of doctors with regards to the new IS is natural because the main activity of the doctors is to work with patients, and the rest is additional work that should not interfere with the treatment process. Therefore, each healthcare institution, which builds and implements e-health systems, is dealing with questions of how to adjust the processes of the institution in order to prevent the overload of the employees by the created systems. The respondents had a similar experience regarding doctors' activeness; doctors' reaction, activeness and acceptance of innovations are mainly dependent on the age and computer literacy. The Younger medical staff has a better approach to e-health innovations, and the older ones take it more difficult. From the respondents' point of view, it is necessary to pay attention to the management of changes to developing and implementing of IS. It is important to inform the staff, to encourage, to properly motivate and to educate consistently. Without these activities, in the respondents' eyes, it will not be possible to achieve that all the employees who are supposed to do so, would properly use the systems and enter the data in the systems. It is also important how the information about IS is presented to the users since it determines the satisfaction in using the systems. If the management of the Healthcare institution is aware of this, it starts a prior active communication with the staff, thus reducing the potential of resistance and shortening the transition period, reduces the challenges of the IS use at the beginning.

Table 5.29. Problems, related to the staff

Generalised attitude	Confirming statements
Difficulties at the beginning of IS usage	42-P-A. The beginning was most probably difficult because of it had to be learnt from the very beginning. We try to mobilise somehow. Actually, when they learn it, no more problems. 20-P-A. In 1995, we learnt it. It was difficult, but we handled it. The nurses got used to it, for them it was a disaster. But all have mastered, and all are satisfied now, we enter the monthly data package, then the cards are closed. 27-L-A. To tell the truth, the efforts were huge. We have formed teams, who were dealing with these matters. To be short, we have formulated a very clear strategy in the company that those things will be implemented, and people will be involved in the entire process. Well, namely this problem was the only and the biggest one. And afterwards everything went on like a snowball, didn't it? Management is like this, if 33 percent is on your side, it means that practically no more steps need to be done with the remaining 66 percent, no need to change their opinion, just time is needed, especially with those, who are opponents, with the latter ones absolutely nothing needs to be done.
Opposition is a natural reaction when innovations are introduced	14-L-IT. Everything needs to be simple. The opposition is huge, some time is needed, something is not functioning, the server crashes and everything stops. 18-L-IT. We do quarrel and then move on to search the solution calmly. Ones come to the awareness faster; the others need time. 4-L-IT. At the beginning usually many problems are faced, but later on they do not want to refuse the system. 8-L-A. Just like all over Lithuania. At the beginning, everybody is angry. Then they start working and then start shouting that it is time to refuse the paper option, that a faster computer is needed, faster servers.
Attitude toward continuous changes	28-L-M. Doctors' approach is that e-health measures have to improve the work of the doctors, but not to make it even more difficult. Continuous installation processes and improvements, the unsecured operation of the installed applications, causes exhaustion and annoyance of the staff. 16-L-A. Aren't we afraid of changes? We have got used to it already. When the e-health started <...> Everywhere had fears, where will we find, where to tick and so on. But everything can be learned. The most important is to avoid system crashes if the data is transferred at a normal speed; this will cause anger for sure.

Generalised attitude	Confirming statements
The existing penalty culture intervenes with the development of e-health	59-Pr-A. eHealth is stumbling and will stumble until the penal culture is present. When the electronic records are introduced, you cannot hide any mistakes. Thus, the doctors are not interested mostly because now they can defend themselves when e-records are absent. And the electronic records are traceable in time, no possibility to edit and to delete.<...> If the culture is not that of the punishment, then the records should go in parallel with managerial means for control of unwanted events. Firstly we need culture, principles, values, and then responsibility and instruments. And not putting the responsibility and instruments ahead.
Presentation of the information on IS defines satisfaction with the systems	27-L-A. We have immediately formulated installation problems and the problem number one, and practically the only problem, which directly depends on us, it was our employees, to motivate them to participate in these matters <...> namely, to motivate those people, to involve them not only on the information level so they know what was going on, but to have them actively participating. We have succeeded in doing that, and I am very happy for that as now people are already asking when some newer things will come. 53-Pr-A. At the initial stage, some kind of opposition appears because it takes more time, and it seems that this is not acceptable. You try nicely, gather several together, show how it functions, and that it might make you tasks easier, that everything is adapted to serve your needs, and try to demonstrate that. For example, to create a template, and then it will be easier. Of course, at the beginning you show the program possibilities for the future. <...> They start clicking and say that it's not as scary as it sounded. So it is very imperative to pay attention and to teach. We do so and practice individual training as well. 62-IT-P. Now it depends on how the information systems will be presented to those doctors. If you slam the door or hit your fist on the table and tell that from tomorrow up you will not pay salaries if the person does not learn to work with the system, well, what kind of motivation for a person would it be. But if you train, explain and show. It means another kind of motivation. You know, I do think still that the majority of people want to improve, but they are scared to say that "I do not know, I cannot cope with it, I do not understand". This generates opposition.
IS interrupts direct duties of the staff	44-P-A If that e-health model is approved by the Ministry, then we'll have to adapt to it, but thinking how much in practice it takes, mainly nerves, how many quarrels, how many slamming of the doors, we go out and grumble, how much it takes from your direct duties because nobody exempts me from it, when we sit in groups or meetings,

Generalised attitude	Confirming statements
	or individually work with developing companies, trying to implement my certain wishes and demands. It is time-consuming and nerve-consuming. 57-Pr-M. Does the information system have at least one button, which facilitates our work? I'll say openly that in some institutions I have neither a computer nor time to be able to go to all the buttons. The system is more of a disturbance for me. I do not have time for it. " 11-P-A. The mechanism for the control of the national health insurance fund works, they want to be secured and to receive everything, but for the doctor it is a tragedy, as per the diploma the time could be allocated for the work with the patient, the same happens with reimbursable prescription drugs, mandatory two copies, all codes to fill in, what level of compensation, to use international names, we learn a lot of new things, really no special facilitation. 33-Pr-IT. In designing the systems, it is necessary to understand what the doctors have to do act – to treat or to engage themselves in additional extra activities. Therefore, we doctors burden the doctors; the data is entered into the system by nurses. A doctor should not be taken away from the patient. 7-P-M. I wish the computer did more by itself. And now we are working on the computer.
Specialists do not know the legislation, governing e-health	18-L-IT. Do we have to read the legislation, governing e-health? I do not recall such…
Staff opposition is determined by limited computer literacy	3-L-A. The human factor is also a problem, a different level of computer literacy, not always everything starts to work one hundred percent, the same problem is with electronic records because there are doctors who enter their records in form 027, while others do not do this yet, well it is also largely depending on the personal characteristics because in principle all should do it. 3-L-A. We cannot choose people, we are happy to have them, there is no problem with young people, and young people are without any problems, even residents have had excellent suggestions for standardization of records during conversations; we share our thoughts with them. 23-L-A. Still a team of IT professionals is needed in order to support programs well. Regarding skills of medical staff to work with IS, it is already stipulated in the requirements for the recruitment to be able to work with certain programs.

Generalised attitude	Confirming statements
	55-Pr-M. Maybe the fear comes mainly due to technical reasons. Doctors think that the electronic format takes much longer than handwriting. We believe that, on the contrary, it takes a shorter time.
The attitude of older staff to the IS	IT-36-D. As you know the age of the doctors ranges very strongly among doctors and actually it is on the older side, they are people who are over 50 – they are afraid of computers. And especially the doctors. W even face such a phenomenon that even young doctors have difficulties working with computers (...) Interests are different, and their life resources are invested not in computers, but into medicine, and this is the brake. 49-R-VT. There is also another thing if I may be excused by the older people. There is also the mentality. I myself, when come across e-health, I get to see children in hospital, everything is prepared, and they still write on a piece of paper because they say that it is faster for them, more convenient. 55-Pr-M. They are used to it, all their life they have worked like this, wrote, and now they need to change everything. Stubborn and the attitude is like this. 33-Pr-IT. Young doctors respond well, and the older ones take it more difficult.
Difficulties in attracting IT specialists to the public sector	37-IT-D. It is a matter of public administration. The amount of time it takes to pass certain decisions – not only in projects, but they are also taken everywhere in the same way. This is really very inefficient. If we have to look at how much time is taken for various disputes when you have a project for a year. Why is it difficult to involve the best specialists in the projects of the public sector? Because it is an extremely inefficient work. The decisions are passed within a very long time, and to develop the best systems without the best professionals – Lithuania could become famous for it because this is impossible to achieve. Professionals are demotivated by this inefficient process. 48-R-VT: There are many who care. But the system will not go forward if the labour force is cheaper than a computer. It is like in a construction company, you hire 10 people, it is cheaper than a tractor. IT-37-D. This is without a doubt. Today IT specialists receive wage offers and with such salaries... They actually choose where it is more interesting. Simply for the fact that everywhere will be OK. So may the project be fun. And if the project is not interesting, demotivating, he will simply not go there because he has a significant choice.

From the point of view of some respondents one of the essential reasons why the design, installation and general development of the products of the e-health information systems in Lithuania is stumbling, is the management gaps of the latter processes (**Table 5.30**). The internal problems of inefficient management in the Healthcare institutions, according to the respondents, usually occur if the management is not sufficiently motivated in e-health issues or takes the position that the manager can stay on the sidelines, and the IS is only administrative measures implemented at the lower levels. An erroneous perception of the systems and lack of modern management expertise of the Healthcare institutions management are identified as the factors holding back the development of e-health. It is important that at the management levels the need for IS is realised for increasing the efficiency of the organisation's activities, and there are organisational measures set forth for the realization of this need.

Table 5.30. Problems, arising due to the lack of effective management

Generalised attitude	Confirming statements
The lack of motivation in the leaders of healthcare institutions	36-IT-D. At the level of an institution, to my mind, a wise leader should see all the products, to choose what suits him/her best and to select that product. In this case a certain attachment appears. If you‘ve let somebody in, to change, it is at the very least a waste of money. <...> I am surprised that leaders are not interested in that. We have been doing presentations of the e-health projects in the beginning while it was still possible to choose something. Documents were not written yet; you could still do something smarter, etc. We have visited practically everyone who manages the project. The picture is approximately like this: the leaders comes in, stays for 10 minutes and leaves. I do not know, maybe they were all fed up before our arrival and we were there just beating a dead horse, that nothing new could be said, but I have the feeling that it is not so. It is just that the head does not need the system...
The need to have modern management skills for successful e-health development	37-IT-D. Today everyone sees it as an inevitable thing, including the leaders and even see some advantages. There are leaders still who are of the older generation with their own different approach to the management, but it‘s mostly small institutions, and if somebody says to them that we‘ll do it, you do not worry about anything – we will come, install and everything will be all right. What does not function like this in real life, but they are happy with this decision. Meanwhile,

Generalised attitude	Confirming statements
	in large institutions as far as I have a chance to discuss, particularly where they are newly appointed, they are very much aware of what it means to administrate an institution.
The need to foresee the perspective of the IS development	60-IT-P. I think that success depends upon the leaders‘ attitude. What is their understanding of the IT necessity, how they imagine the IT department, like an administrator or a strategist who is interested in what is going on in the world, or invites potential suppliers.

According to the respondents, the IS in an organisation must not be "politicised", and it is just a tool to help carry out daily activities, to improve and to accelerate service providing. If IT products fail to assist in achieving these goals, they will not be used, and the part of the financial means, allocated for the healthcare, will be spent inefficiently. Leaders of healthcare institutions emphasised that at the national level the e-health projects are delayed due to the complexity of the project of the health service and cooperation infrastructure and the need to integrate with the existing systems. To establish links in order to have everything standardised in the internal healthcare institutions systems and to ensure the communication of data among the Healthcare institutions is a rather long and complicated process. In addition, the healthcare institutions "have already their own life", their systems and rules, and the creation of the national system determines that the institutions will get instructions on what they should do differently. The complexity is also determined by the fact that there are many stakeholders involved. It is hard enough to coordinate quickly their interests and attitudes and to take decisions regardless of the stakeholders would be an inappropriate way.

When talking about preparation and implementation processes of the e-health projects at the level of the healthcare institutions, the respondents said that their effective and successful realization is interrupted by uncertainty on the state level, that there are no systematic solutions taken, changes in the legal framework, rigid and problematic public procurement processes, too short terms for development and implementation of the projects, timely and adequate financing is not ensured. Moreover, among the factors of the internal organisation's problems there were the following factors mentioned: a too short time for projects implementation, the lack of communication among the project partners and the lack of project management skills (**Table 5.31**).

Table 5.31. Problems, related to the projects

Generalised attitude	Confirming statements
No centralised system, no plan for project implementation at the national level	11-P-A. As for the e-health, I wanted a national system, designed centralised steps on how the regions should come into the system. <...> The region have received the projects from authorities, we were among those who wrote, there were initial criteria determined which we followed, then the criteria were withdrawn, added a few more institutions from the region and told "you have two million, make e-health", some were not present at the initial stage.
Lack of communication among project partners	5-P-A. This is what I am explaining to you that the disadvantage of that project and all the projects, is the absence of communication. 11-P-A. In the region each institution provides its own vision, I missed the common matrix, it was not clear what result must be achieved, some prefer one way, other some another way, at the time of making the application we just knew that something will be implemented, but the project was completely different from the application.
Procurement related issues hinder the implementation of projects in time	27-L-A. Well, the time limits are destroyed by public procurement, something has not met the requirements, somebody has stopped, something has to be started again, you send somewhere, you do something again, you have to wait for fifteen days, you did that again and again you have to wait for fifteen days, you know. 60-IT-P. Both procurements were announced at the same time, but the ePrescription is a subsystem of health service and communication infrastructure, it's good if the same supplier wins. But the tender was awarded not to the same, as far as I know. The health service and communication infrastructure is the main system, so just imagine, a public procurement is ongoing. As usual all kinds of claims and complaints, but having been tendered at the times, they will not necessarily enter into contracts at the same time and start their execution. There may be complain about the results, may complain still in the course of the process until handing over. Usually, this is what happens in Lithuania, so to have the illusion that they will start at the same time, let's say in September or

Generalised attitude	Confirming statements
	October both projects, is absolutely naive. If they start at different times among each other, again it is not clear which one goes first. It means that again they interfere with each other's work. As it was stated in the technical specifications, it is actually a single system. And one system needs input from another system, and the latter one has not been started to develop yet. Even the contract is not signed. So automatically this story also, and it has its own terms and deadlines for completion from the signing, well, and some basic problems. These are just some technical (issues) overlapping with time. 60-IT-P. The term was very clear to present to the CPMA in 2007–2012 in order to receive the money, and the projects are financed from European money and all this prolonged process simply shortens the time for the implementation team, and the implementer stands at the very end... of all those public procurements.
Terms: changes in legal framework determine too short terms for project implementation	26-L-IT. How are the terms? Bad. Everything is bad... A slight lack of information actually regarding the way of execution, some coordinations and... the authorities responsible for coordination, let's say, IS specifications, what we really focus on while creating our own technical specifications. These are documents related in-between, but they were also being coordinated for a very long time and practically almost up to the last period the submission of comments was delayed. 41-IT-P. And another thing, of course, is where a similar situation, already in the project implementation, especially if it is longer, of a big scope because it could be year or two. During the progress of the project the legal framework is changing or simply the customer's needs change, it is also inclusive. If it is still during the early stages of the project, it is basically probably not having a significant impact. However, for example, some sort of changes, let's say in the legal framework, the needs, appear at the earlier stage, well, I do not know how much earlier it is, let's say, at least in the last one-third of the whole... In fact, it may determine the overall results because then it is necessary or revision. 41-IT-P. The other is like here, perhaps here is not that the problem is such a situation, it is the very same legal framework of ours or legal changes, sometimes they are coordinated for a very long time and then after they are approved, the time, left for implementation is very short.

Generalised attitude	Confirming statements
Terms: a too short period for project implementation	25-L-A. The terms, what about the terms, let's say, they are not favourable actually the time is perhaps a little too short. 28-L-M. In general, there is always the lack of money and time.
Sufficient financing is not ensured	44-P-A. I would like to go back to the funding of innovation, as for the legal basis everything is all right, without it again we would not do anything, but in the same way as funds for medical equipment, innovation, updating of the medical information technologies would cover all and would allow everyone to do the same, still, the funds are spent. To have them maintained afterwards because the money of the project ends and then the institutions is left against the fact that it has to do it, or it does not do it. 32-R-VT. The project must include the maintenance for two years or three years, a new need and the money for the item to be allocated. 3-L-A. Not every doctor's office is equipped because of the lack of computers, but the number of computers is increasing. 25-L-A. Something is used, something is not used because, for example, there is a lack of a simple computer base in the network, well let's say the equipment, computers and this is the reason why they cannot use. Thus the system does not function fully.
Lack of competence in project management	22-P-A. Different computer literacy in a healthcare institution, competence in project management. 32-R-VT. I have a good management from Santariškių Clinics, at least I myself have worked there for a year, I could clearly see the lack of such people. Such people must be prepared by universities, I think, the managers with e-health, IT knowledge or universities of technologies, which prepare, would give the knowledge of the e-health sector. 60-IT-P. Again it dependents on the institution, how much experience it has in project management. Proactive and sees the need, understands. The internal IT need is very different all over the institutions in Lithuania. In some places it would be limited to the fact that they have the IT infrastructure, i.e. a PC, which is available in every IT company and have professionals who supervise computers and printers <...>The differences depend on the attitude of the leading executives.

When talking about the implementation of the national e-health strategy at the healthcare institution level, the respondents, especially from smaller and/or regional healthcare institution, said that they see no point in having their own organisation strategies and plans in the field of e-health, because of the lack of clarity and stability in the national strategy (see **Table 5.32.**). In addition, some interlocutors emphasised the influence of the policy formulation and the implementation cycle. According to them, the failures of the creation of the national system are due to the fact that no project is possible with the duration exceeding four years, and if the Ministers change even more frequently, then the regrouping of the priorities and the change of interests have a direct impact on the consistent implementation of the e-health strategy. In spite of the fact that public procurement tenders can already be awarded, there is a chance that the Minister may modify the requirements, and this would affect the implementation progress of the ongoing projects. Therefore for healthcare institutions, which have no internal strategic documents of the e-health implementation development, the main guideline for organizing IS development, implementation and maintenance processes is the implemented e-health projects, and the situation changes are taken into consideration promptly, without trying to look into the future with a strategic approach.

However, there are healthcare institutions, which are aware of the IS importance and impact on the organisation activities, consider the meaning of the systems' development through strategic management principles. Such institutions have e-health strategy documents approved and follow them as the operational documents which contributed to a better management of the e-health development.

Table 5.32. Problems of internal strategic management

Generalised attitude	Confirming statements
A strategic plan for the institution is not possible because there is no National Strategy clearly formed	25-L-A. No,, we do not have a strategy. We rely on the project itself because I know that before all these projects appeared, there was no national e-health, then why form */a city name/* some kind of an e-health strategy if there was no national either.

Generalised attitude	Confirming statements
	27-L-A. Do we have the e-health implementation strategy or a plan? Partly yes, partly no. Because I do not know what happens in Lithuania afterwards, how all these processes will continue there. The local strategy of our institution, I think, the vision is very local, very clear, how this matter has to be done, and there is nothing new to it. We, of course, have a vision of how we will implement, but one way or another we are dependent.
The Implementation Plan of the e-health Strategy is the basis for the organisation of the IS development	26-L-IT. We actually have created an implementation plan for the e-health strategy, and we are fully following it. In fact when we were creating this e-health project, the aim was to shoot two birds: to create that strategy and to create a product which will be the centre for implementing our strategy.

5.3.4. Problematics of design solutions and systems architecture

The list of problems in the field of architecture of e-health information systems and design solutions is rather long and varied. This field involves such challenges as identification and coordination of needs, expectations for the final product and the problematics of its manufacturing process, the competence of IT companies, IS appearance, etc. (**Figure 5.10**).

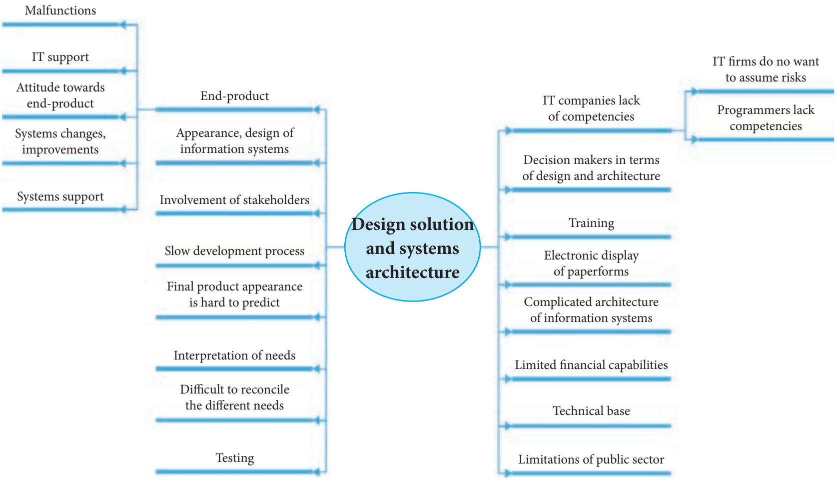

Figure 5.10. The structure of content analysis of the problems in the field of architecture of e-health information systems and design solutions

All of the respondents agree regarding the need to implement information systems in the health sector. The main reference point in the design of the architecture of e-health information systems and other elements is the final beneficiary. However, the interview also revealed a variety of views on the main e-health beneficiary. Some respondents thought that e-health implementation has to be patient-oriented, and the patient is the main e-health beneficiary. The patient can see personal data; there is no need to waste time when going to the healthcare institution as the data is available online. For the organisation, the e-health creates the added value of attracting and retaining the patient. The main e-health element in this respect is the convenience for the patient. Some of the respondents pointed out that at this stage of e-health development we should not talk about benefits to someone other than the patient, later on the benefits will be felt by the Healthcare organisations as well.

Another group of respondents highlighted a doctor as the main beneficiary of benefits, originating from the e-health system, although they do acknowledge benefits for a patient, too. According to them, doctors are satisfied and always support those measures which save their time. However, they are not happy when due to e-health development additional work is imposed, namely encoding, information search. The entire time of a doctor should be dedicated to the patient. This issue is particularly sensitive in the primary healthcare organisations, where a patient is given a very limited time. Thus, if at the expense of the patient's time it is necessary to fill in electronic forms yet and duplicate records on paper, it causes doctors' dissatisfaction. The administrative staff of Healthcare organisations is aware of this problem and is looking for possible ways to organise the work more effectively in combination with e-health solutions. Still, the respondents note that the current legal framework does not create sufficient conditions to organise the processes of Healthcare organisations is such a way which would avoid duplication of work and would lead to the achievement of economy of Healthcare organisation funds due to implemented e-health functionalities.

Some respondents mentioned that e-health can be useful not only for the patients and/or doctors but also for scientists. If health researchers could obtain health information about the number of patients, suffering from a certain disease, the development of the disease and treatment characteristics and so on; this would allow to calculate and plan the costs for treatment, the disease control strategies and so on.

During the interviews, various groups of respondents (Heads of healthcare organisations, IT specialist, representatives from IT companies) expressed their opinion on e-health development stages. In their view, the IS development process is one of the most complex processes because a three level architecture shall be built: the design, the process control/logics and the database. The development process has to involve as many stakeholders as possible, representing various fields of activities, sectors, and levels. At this stage, the most important factor is cooperation. All possible/associated representatives have to be involved: doctors, nurses, programmers, analysts, patients, public servants. The involvement of all stakeholders conditions the success of the e-health project. A great diversity of stakeholders leads to a large variety of needs and demands. Therefore, it is important to find out those needs and coordinate in advance, before starting the development of the system, and to continue their revision during the whole period of IS development and implementation. The variety of needs, their complexity and the necessity to coordinate them determine the actions of Healthcare organisations to look for the best time and method to involve stakeholders and to take decisions on IS architecture and design (**Tables 5.33** and **5.34**). Different Healthcare organisations do it in different ways. Some of them take the decisions without the involvement of the majority of stakeholders, especially if the Healthcare organisation tends to resist strongly innovations. Meanwhile, other Healthcare organisations attempt to take decisions collegially, by ensuring a continuous participation of stakeholders during the whole process of IS development and implementation.

Table 5.33. Respondents' approach to the compatibility of needs, decision taking regarding the IS design and involvement of stakeholders

Problematic area	Generalised attitude	Confirming statements
The compatibility of needs	The variety of needs and the complexity of their compatibility	46-P-IT. The most difficult thing is to coordinate...The head of the laboratory and the staff of the laboratory aim at their own target. They say certain things should be additional or mandatory. Administration possibly wants something else. Statisticians say that they need to calculate this and that. Accountants say that they need this and that for calculations. And when those desires are in such an abundance from all sides, it is hell of a job to model in order to meet the expectations of each member of the group and to be able to get the highest efficiency.
	IT impact on the development of the needs	42-P-A. We worked on a list and checked it continuously. The compatibility exists to some extent. Let‘s say on paper it has its shape, and in the information system it turns out that it lacks some information: what fields are missing, how to classify them in order to put classifications to save entering manually. We took as little as possible forms from the Ministry, but the nursing form was an extensive one. However, now it turned out to be double in size because we have found out that we need more.
	The importance of clear formulation of the needs	48-R-VT. IT companies are not to be blamed for the fact that it is complicated. They focus on their business-wise approach. If they are not provided with specific assignments, why they should do it. Another question is why the assignment formulation is so vague that later on they do not know themselves what they have ordered.
The decision taking regarding the IS design	Hierarchy structure bottom-up	42-P-A. Dissatisfaction with the form is firstly coming from the offices, the heads of departments. Then we come together and transfer the information to the seniors. Then we form groups. We think if it is possible to do that. Probably there is a way to do it somehow.... after all, everything is possible.

Problematic area	Generalised attitude	Confirming statements
	Management decisions	18-L-IT. How does the architecture and design of the system come to life? The management says that it has to be done.
	Collegial search of a solution	33-Pr-IT. We ourselves take decisions regarding the design, i.e. what the need is, rather than hiring the consultants. Regarding the need, first of all, I personally try to understand by speaking with the office staff. Then I talk to the implementation team; they provide an estimate of how much the new functionality will cost.... The IT company should not do as they consider being better, they should follow the customer wishes.
	The importance of competence for decision-making	IT-41-P. We do not leave design issues entirely to the customer. We make suggestions. In fact, it depends on the customers' confidence in their knowledge and strength.... If to talk about a particular customer, let‘s say organisation X, in general, it is like this that they have their own opinion about the design and require the design to be like that.... Well, what I intended to say is that it is also highly dependent on the customer‘s democracy, how much the customer allows the execution team to make the design in such a way which looks more appropriate for the execution team.
The time and ways of the stakeholders' involvement	The importance of doctors' involvement at the beginning of IS development	55-Pr-A. Preparation of the form together with doctors, I may say, depends on the form itself and doctors. If they participate in the process and show initiative, they in practice provide us with the material. At the moment, we are working on a generic form for the consent on blood collection. The form is prepared, today it will be approved with all the new revisions. Then we will work with doctors in order to have everyone associated contributing to the content. Well, it is comments entered by doctors, indicating the kind of possible complications of the intervention and so on. And then the work will take place according to the consent form itself. IT gets involved at the very last stage when all prior things are done, and the form is ready.

Problematic area	Generalised attitude	Confirming statements
	The importance of constant participation of future IS users	37-IT-D. The later you want to make adjustments – the more costly they turn out to be and takes longer time.... The sooner the customer sees how things will look like, the sooner the testing is dome not only by the customer, but also the users (well, let‘s say some doctor) are given a chance „to browse, to click“ in order they could say whether it was convenient for them, the more economical the project will be. If you present a doctor with the system without explaining how he/she will have to use in a year, and you will just say „let‘s turn it on and go ahead“, do you imagine the outcome....

In addition to the identification and coordination of the needs, it is essential that they are properly present to their potential executors. External IT companies can submit specific proposals regarding creating of the IS with regards to the recommendations of the best practice, the most appropriate user interfaces or the standards of other IS elements. However, it must be taken into account that the IS development and implementation companies will have to find such solutions which satisfy customer's demands because usually the executors have to adjust according to the contractual provisions. If the customer is open to suggestions, and even requires following more standards, in such a case an IT company can offer to the client better solutions than the customer can imagine, more standardised and customised, more convenient and flexible solutions. In this case, it strongly depends on the customer's and service institution's ability to communicate and collaborate.

When talking about e-health design, the respondents mentioned that all Healthcare organisations should use a similar design and should have common elements. The closer the design of all the institutions, the easier it is for all the users to understand different programs faster, which are used in different Healthcare organisations. Respondents from Healthcare organisations which are advanced in the field of e-health recognise the importance of using modern technology. As in Lithuania we have a well-spread Internet network, respondents believe that WEB technology should be applied which requires no installation work, just an Internet connection is needed, and it is important to use international standards. However, healthcare organisations in the regions have not the same topicality of e-health technological solutions and its elements because these organisations have not solved the provision of a sufficient number of computer equipment to the staff yet.

Table 5.34. Attitude of the respondents toward IS creation, architecture, and design

Problematic area	Generalised attitude	Confirming statements
The IS creation	The slowness of the process	28-L-M. I think that the processes of design, installation are too slow in the health system, having in mind the capabilities of modern technologies and human resources. The usage depends on how much and what kind of instruments of functionality we have because if we had more, we would use more.
The IS architecture	The complexity of the IS architecture	44-P-A. Here I say now, for example, such a simple thing, there is … that form zero twenty-five which we fill in. So, it is convenient... But we calculated with doctor X, how many steps we need to fill it... It came up to twenty, at least... Well, we say that it is difficult, takes a lot of time. So now in this new form we say that it must be truly less. And as Google states, if you want to find something, you will need not more than nineteen steps, and you will surely find that information.
	The difficulties in predicting new needs	48-R-VT. But is it possible to formulate everything? Here I do agree, information systems are so complex that it is impossible to control everything.
	The issue of the convenient usage of the IS in the public sector is not solved	IT-37-D. I have really tried to use not so long ago some, let‘s say, forcibly installed state systems, in health and other mandatory areas, where I have to declare something, it is... well... a so-so experience, I have to say... I am as a consumer, and I have the degrees in business and engineering. And I have stress in using those systems. There is something truly wrong there... These systems are for

Problematic area	**Generalised attitude**	**Confirming statements**
		the mass consumer and everyone starting with the farmer on to the professor has to connect in a minute without reading any instructions and do what is needed. If the consumer fails to do so, it is a matter of the engineers to fix it that they are convenient to use. Today it is not the case.
The IS design	The importance of simple usage	22-P-A. The design has to be clear and simple. This is important because e-health solutions are used at work permanently (doctors, nurses and other staff). <...> Every item you want to reach, the action you want to carry out should be possible to do in three mouse clicks. Presentation of the most important and most relevant information in the optimum location has to be though over. All healthcare institutions should have a similar design, should have common elements. The closer the design among all the institutions, the easier it is for all users to understand the different programs fast, which are used by different healthcare institutions.
	The most important is functionality, not the design	27-L-A. Like in most cases, there the product is from an entirely different company. So, let's say, you continue to implement... They make this functionality for you, specialists sit and use that functionality. They sit, press buttons and watch the language of the functionality, check how convenient it is, paying no attention to the colours, to the design. Let us say that the design is as it is. What is the problem there – I like green, you like red, but what should we do now, start replacing, or what?

One of the essential problems in the development of the IS of the e-health, which determines the success of the e-health system, is the need to decide clearly who is the main beneficiary of the e-health. According to some representatives of the state-level institutions, although the principle of all the healthcare is a focus on the patient, the e-health must firstly serve the doctor. The biggest benefit of e-health systems will be experienced by patients at that moment when these systems will facilitate the work of doctors. However, in order to have the IS effective and not becoming additional and/or duplicative actions, it is necessary to align the activity processes of the institutions with the functioning processes of the IS. However, the flexibility of organisational processes is often limited by a very detailed and strict legal regulation of the healthcare area. So, there still exists a problem of the compatibility of the activities of the healthcare institution and IS processes. This problem was mentioned by representatives of IT companies, installing information systems in healthcare institutions. To their mind, when healthcare institutions implement e-health solutions, they often do not foresee changes in activity processes, revisions while aligning them with the conditions of IS use. In such cases IS is not supporting to effectively use personnel and material resources, but it is even complicating by additional or unnecessary activities (e.g., filling of paper registers when electronic data is available already) and intervenes with the working atmosphere. Therefore, the respondents suggest that firstly it is needed to realise that the main beneficiary of e-health is a doctor, then to direct the development of the entire system according to the treatment processes, not forgetting to revise and update them, aiming at the compatibility with the IS processes.

Another very significant problem, specified during the interview, is the continuous attempts to reflect ordinary paper forms electronically and the duplication of activities, filling data both, in IS and in paper forms (**Table 5.35**). The most painful aspect for the respondents, representing healthcare institutions, was that doctors and nurses have to do a double job because of this problem. Meanwhile, the representatives from external IT companies quite often emphasised that customers themselves do not realise that in order to create a proper IS, it is necessary not to focus on the digitization of ordinary forms, but to analyse the processes of activities and according to them to shape the system architecture. Once the processes are clear and once it is clear why a certain group of future users performs one or another action and fills in relevant documents, solutions, which facilitate the work, can be found.

Table 5.35. Attitude of the respondents toward the final product, the consistency of paper and digital forms

Problematic area	Generalised attitude	Confirming statements
Final product	Difficulties in foreseeing the final result	14-L-IT. Being a representative of the IT side, I believe that above all, it is most important to have the system convenient for users and to have the system functioning properly. And the way it will look is practically unknown in advance.
	Support to the user for a better understanding of the final result	37-IT-D. Why can we control processes within a shorter period of time? Our implementation method is a bit different because we have a lot of visualization. <...>A typical situation: the customer is given a book and it is said, "This is a specification for production You probably do not understand anything, but sign because otherwise we will do nothing"... well, some pictures are included too. But we have such prototypes, which allow you to browse, to see how in about three or four months the working system will look like in the end. There it is actually visible, what the program is, how it is presented, what about the navigation, is it convenient, fast.
The consistency of paper and digital forms	The need to change attitude about IS, that they are not a substitute for paper forms	37-IT-D. All are trying to continue the „paper" habit, but only electronically. It is necessary to have the thinking changed that there are new tools... Everybody wants to see the same what they had on paper, just only on the computer. But the fact that a lot of what you used on paper before is no longer needed somehow, people usually do not try to comprehend.
	The desire to reflect electronically the same forms like on paper	41-IT-P. Based on our experience the design was probably more similar or compared to the paper document forms. In order to satisfy the user's and the consumer's convenience, it was compared with the fact that if earlier some paper forms were used, then they should be as close as possible at the transferring them to a computer screen. Just to make it simpler and easier at the transition.

Problematic area	Generalised attitude	Confirming statements
	The necessity to review the processes while implementing the IS	48-R-VT. You see, computerization provides the review of all the work processes, if you do not do that, and will work just like with paper forms, then nothing can help.

When talking about the IS design peculiarities in the institutions of the public sector, representatives from external IT companies raised the issue that there is a mistaken attitude in this sector that the systems to be developed are fundamentally different from the products, created for private organisations (**Table 5.36**). In their opinion, just the same like in private organisations, when developing an IS for public institutions, you need to think firstly about the future users, their needs and convenience in operation. However, they do note that the expectations of the e-health participants, who daily work with the systems, are far too little considered.

Other peculiarities of IS development and implementation of institutions in the public sector, which are disturbing the development of the e-health system, according to respondents, are inflexible formal requirements. The IS development is a constantly evolving process, where there are new needs emerging constantly, errors are observed, new possibilities are noticed, but formal requirements do not allow to react quickly and flexibly to the dynamic environment. Therefore, the product quality can decrease, users' dissatisfaction may be caused due to non-compliance with the expectations. This can increase the users' resistance, to slow the comprehension of the IS, and then can require additional time, human resources and funds for the improvement of the system.

One of the most topical issues for some, particularly regional, healthcare institution representatives remains insufficient funding. Even though resources are allocated for e-health projects, it is not sufficient to be able to realise the needs.

Table 5.36. The attitude of the respondents toward the peculiarities of the IS creation in the public sector and financing peculiarities

Problematic area	Generalised attitude	Confirming statements
Peculiarities of the IS creation in the public sector	The question of the convenience to use IS is not solved in the state sector	37-IT-D. It is simple, whom we represent. We represent the user. In the wide sense. And when people say that “no matter that you have installed a self-service system in a bank or telecom, in the public sector everything has to be in a different way”. I say then “hold up, those banks have 1.5 million users (those who use the bank), they have a certain level of expectations, what kind of services to expect today”. <...> When a user comes to the public sector, and there he finds no level as such, everybody asks – why? The very doctors use banking systems and when they come to a computer for using health systems; they do expect at least the same level, don’t they?
	Formal requirements, limiting flexibility in IS creation	60-IT-D. Well, I think that IT companies, each of them, are interested in carrying out a project, no company has a target to slow down or ruin the project, or to eliminate it and to spoil its name. But we here face that IT, follow the public procurements logics, has to do what is stipulated in the technical specifications even if you see in some places that it is nonsense, and it will not function. <...> Later on the customer also sees that, well, some nonsense has been written or something has changed. Those changes are not possible either because Central Project Management Agency will check what was in the requirements and so on. The only possibility is to revise the specifications.
Financing peculiarities	Limiting financial capacity	26-L-IT. If it was a private enterprise, the criteria would be totally different, and the choice would be different… One thing which is always the basis of all the possibilities is the financial capacity. Now we are “pushed to” absolutely… well, to let’s say, very little space, not spacious boundaries, thus it is very difficult to choose what you want.

Summarising the problems at the creation and development of the e-health system, which were highlighted by respondents, it became evident that the problems in all of the areas mentioned during the interview (legislation and regulation of the e-health system, cooperation and communication between the participants of the e-health system, internal organisational problems in planning the development of e-health, architecture and design solutions of the e-health information systems) are interrelated and often it is even difficult to identify whether a problem from one area is the reason or outcome of the problem from another area. Still, we can state that despite the area the respondents tackled, they most often emphasised the importance of communication and cooperation as well as disruptions noticed or experienced.

5.4. Summary

The accomplished qualitative research has revealed the attitude of e-health participants that the success of the e-health development is very much dependent not only on the technical and technological solutions of IT systems but a no less important is to set the scope and goals of the e-health system application, to have legal regulation, consistency of IT systems and activity processes, stakeholders' involvement.

The participants of the e-health system, representing all groups of respondents, agree with the need to cooperate closely in the development of the information systems in healthcare institutions. Involvement of employees from all the levels is imperative – administrators, doctors, nurses, IT specialists should be included. But the research shows that so far such cooperation usually occurs mainly within the organisation. Meanwhile, the cooperation between the institutions on shaping of the e-health policy, development and implementation of the e-health solutions is still fragmentary, based more on the personal communication, rather than a systematic transfer of knowledge. So far there is no platform established, connecting participants of the e-health system into a network, and ensuring their communication and knowledge transfer.

Interviews revealed that most of the problems, having impact on the efficiency and effectiveness of the development of the e-health system, are within the areas of the legal framework for e-health systems and regulatory mechanisms, cooperation and communication between the system participants. Deficiencies in these areas determine internal problems of the healthcare institutions in planning e-health solutions and their implementation, as well as shaping the solutions of the information systems' architecture and design and implementing them.

In the opinion of the management and specialists of healthcare institutions as well as of the leaders of IT companies, the main reasons for failures of the Lithuanian e-health system development during the first stage was the inefficiency of the Ministry of Health to mobilise all the stakeholders, to properly assess and coordinate their needs and to prepare a reasonable strategy and legislation, supporting its implementation. Currently, once the mistakes of the past are evaluated, there are positive changes observed in this area. Still, a stronger coordination is missing in order to integrate separate information systems and to mobilise the e-health participants, although the principle applied is to cooperate more healthcare institutions together for realization of the projects for development and implementation of e-health information systems. However, the problems appear not only within the vertical (among healthcare institutions, IT companies and state regulatory institutions) cooperation and communication between the participants of the e-health system, but also within the horizontal one (among healthcare institutions). Therefore, a smooth communication and consensus is not always present even among the project partners.

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6. STAKEHOLDER ROLES IN eHEALTH PROJECTS: SOCIAL NETWORK ANALYSIS

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Any innovations, including e-health solutions, face high uncertainty as it is often necessary not only to find an unexpected and new solution but also to foresee very complex outcomes of the solution. Most often, situations are new to everybody – practitioners and theoreticians and there are no off-the-shelf solutions. Such performance requires not only an innovative result in the subject matter but also an innovative managerial thinking in the changing of an organisation as such and in the processes undertaken.

The development of the e-health system requires inter-disciplinary knowledge. It is here that health, IT and management knowledge intersects, supplemented by knowledge in the areas of education (learning speed of innovations), psychology (resistance to novelties), economics (cost optimisation), forecasting (envisaging technological development), etc. As a result of the tension emerging among different stakeholder groups, it is consistently observed that patients are dissatisfied with the quality of service and service providers have observations for policy-makers or providers of technological services.

Once the e-health system has been created other challenges emerge, for example, the need to assess the existing result, measure its functionality and rationale. Thus, the issues of e-health development and deployment intersect with the responsibility and accountability of e-health management. Performance management deals with the issues of measuring higher responsibility and success[560]. However, the adaptation of the contents of

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e-health requires additional efforts even if performance management recommends standardised performance assessment models[561].

Performance management practices single out two approaches[562] – intra-organisational perspective and extra organisational performance perspective. The intra-organisational approach includes system performance methods, organisational practices, an organisational structure necessary to achieve results, meanwhile the extra organisational approach mostly refers to joint actions of stakeholders and communication with them.

The analysis of intra-organisational performance management has already been more or less standardised[563] and the agreement has been reached on the methods of operation. Meanwhile, external factors are still rather weakly developed in terms of performance assessment although the role of stakeholders in health policy and management is not a novelty. Stakeholders know each other, they are involved in decision-making processes, consulted, and policies are geared towards them[564]. The dynamics or needs of stakeholders and the reflection of such needs in an organisation's operations, however, are not yet used as system performance indicators, although a considerable number of failures in the e-health system development may be explained by undeveloped stakeholder co-operation. Capacity to capture the engagement of stakeholders and their involvement roles as well as strategic solutions formed with regard to such indications can lead to the development of an e-health system capable of timely response to changes and better meet the needs of future e-health system customers.

Two **research objectives** have been set for this purpose: to carry out a study of the stakeholders active in the development and implementation of the Lithuanian e-health system and investigate their roles in the entire e-health development chain. Once it becomes known how the stakeholders share roles, the involvement practices predominant in the development of the e-health

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system can be reconstructed. They may be used as a basis for forming the indicators for measuring performance management efficiency in relation to the stakeholders and, subsequently, for drawing up the strategies to improve such indicators. The second objective is to integrate the methods used to get to know the stakeholders into the measurement system of the e-health system performance by selecting the most suitable methods for this purpose.

6.1. Literature review: engagement of stakeholders into e-health development processes and their impact on performance management

Importance of stakeholders. The number of scientific publications which has been constantly growing over the recent two decades on the issue of stakeholder engagement and their roles in all activity sectors shows that stakeholder integration is complex and not lending itself to a clear-cut solution. Hence, it is still a relevant scientific issue[565]. The researchers of stakeholder theory continue exploring how to get to know stakeholders, how to respond to the matters of concern to them, although even the pioneers of stakeholder theory do not have any ready-made answers as they admit that they still fail in providing any theoretical recommendations that would function as algorithms to facilitate day-to-day managerial decision-making[566]. Most researchers treat organisations as black boxes[567] when studying the autonomy of stakeholder management process within organisations, resulting in a lack of attention for internal processes. Practitioners, however, need specific strategies and their implementation methods how achieve organisational success together with the stakeholders.

In the research of health care institutions (HCI) and their relationship with stakeholders, theoretical assumptions on stakeholders are matched to performance efficiency, understanding a health care organisation as one participant of a broad network of players. A network of the private sector

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could be potentially treated as finite and comprised of a limited number of players, however, the networks formed by the public sector and the private sector become complex as a result of highly diversified operational modes and difficult to explore due to the confrontation of political interests[568].

HCI themselves are often interested in a greater engagement of stakeholders as a result of highly complex reform contents, in particular, if arrangements for wider scale changes are made. It is often that an analysis of financial and accounting criteria is no longer sufficient for HCI changes[569] – the need arises for new criteria for changes in quality, efficiency, sustainability, cost effectiveness and accountability[570] and their assessment. In addition, changing needs of stakeholders, the variety of needs, different priorities of various stakeholders encourages the search for methods to tune up, measure and assess such stakes. The involvement of stakeholders and continuous co-operation as such provides a stimulus for the health care sector to search for different modes of operation as well. Such practice options are often sought in market oriented sectors[571], i.e. business. The new modes of operation, in an effort to listen to each individual interest, inevitably lead to conflict situations[572] among individual interests and institutions pursuing such interests. Such research, however, is rather limited in scope and numbers due to the complexity of the research object[573].

The progress of information technologies, which has facilitated the creation of electronic health care services, referred to by the common name "e-health solutions", has also formed preconditions for better engagement

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[570] Alonzo, A., Simon, A. (2008). Have stethoscope, will travel: contingent employment among physician health care providers in the United States. *Work, Employment and Society*, 22: 635–654.

[571] Koelewijn, W. T., Ehrenhard, M. L., Groen, A. J., van Harten, W. H. (2012). Intraorganizational dynamics as drivers of entrepreneurship among physicians and managers in hospitals of western countries. *Social Science and Medicine*, 75(5): 795–800.

[572] Guisset, A.L., Sicotte, C., Leclercq, P., D'Hoore, W. (2002). Defining hospital performance: a survey among key stakeholders in hospitals. *Sciences Sociales et Santé*, 20(2): 65–102.

[573] Mauro, M., Cardamone, E., Cavallaro, G., Minvielle, E., Rania, F., Sicotte, C., Trotta, A. (2014). Teaching hospital performance: Towards a community of shared values? *Social Science and Medicine,* 101: 107–112.

of stakeholders and, hence, also for the assessment of joint actions[574]. The present-day maturity level of e-health in Europe is such that citizens may receive developed distance services – this has increased the accessibility of health care and enhanced the overall quality assessment of health care services. Both patients and health care specialists have acquired more instruments for the achievement of common goals. E-prescription, e-health record, telemedicine services could be mentioned among the most necessary and best of all developed instruments. Unfortunately, together with the benefits brought by the development of e-health, quite a few issues specific to the sector emerged. One of them is the engagement of stakeholders, the standardisation of co-operation relations, legal regulation, shortage of finances, personal data protection, socio-economic impact assessment and similar issues[575]. E-health development practices show that challenges reach beyond one organisation and affect more complex social phenomena in the society with solutions often hidden to the needs and understanding of stakeholders[576, 577, 578]. Hence, the application of new technology-based systems mostly depends on the ability[579, 580, 581, 582]:

- to get to know each stakeholder group,
- to hear their interests and needs,

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[574] Venkatraman, S., Bala, H., Venkatesh, V., Bates, J. (2009). Six strategies for electronic medical records systems. Communications of the ACM, 51(11):140–144.

[575] European Commission. (2011). European Countries on their journey towards national eHealth infrastructures, *Final report*, ISBN: 978-92-79-19766-6, p. 46.

[576] Blake, R.T., Massey, A.P., Bala, H., Cummings, J., Zotos, A. (2010). Driving health IT implementation success: Insights from The Christ Hospital. *Business Horizons,* 53: 131–138.

[577] Ash, J., Gorman, P., Lavelle, M., Lyman, J. (2000). Multiple perspectives on physician order entry. *Journal of the American Medical Informatics Association*. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2243815/pdf/ procamiasymp00003-0062.pdf>.

[578] Lorenzi, N., Riley, R. (2000). Managing change: An overview. *Journal of the American Medical Informatics Association*, 7(2): 116–124.

[579] McLoughlin, I. (1999). *Creative technological change*. Routledge Publishers: London.

[580] Hage, E, Roo, J.P., van Offenbeek, M. AG, Boonstra, A. (2013). Implementation factors and their effect on eHealth service adoption in rural communities: a systematic literature review, *BMC Health Services Research,* 13(19): 1–16.

[581] Singleton, P., Pagliari, C., Detmer, D. (2009) *Critical Issues for Electronic Health Records, Considerations from an Expert Workshop*. The Nuffield Trust, London.

[582] Boonstra, A., van Offenbeek, M. (2010). Towards consistent models of e-Health implementation: structurational analysis of a telecare programme's limited success. *Information Systems Journal*, 20(6): 537–561.

- to reveal the essential differences in the stakeholder understanding of IT solutions,
- be able to get closer to a common understanding of added value for all stakeholders.

Hence, the involvement of all stakeholder groups not only leads to a better management of complex processes but may also encourage the whole organisation to seek higher goals and new quality standards. The added value of the role of stakeholders has already been perceived and even assessment schemes for integral e-health development have been created. One of them, suggested by Dansky and co-authors[583], structures e-health evaluation along four dimensions: e-health methodology and design, technologies, environment and logistics. The role of stakeholders has been integrated into the fourth dimension (**Figure 6.1**):

- **Methodology and Design.** The methodology underpinning the construction of the e-health system. Design most often is a form of implementing a strategy, which is based on strict procedures and in this way ensures the validity of the system designed.
- **Technologies.** Technologies include: (a) technical requirements for the software and hardware, (b) infrastructure and resources to support the technology, (c) relationships between the provider of technologies and e-health owner; (d) user training and satisfaction; (e) System maintenance.
- **Environment**. The environmental dimension covers legal challenges related to privacy, confidentiality, data security.
- **Logistics**. Personnel needs for the quality of a system, personnel skills and the upgrading of skills to the required level for using the technologies. E-systems are often designed and implemented by multidisciplinary teams. Therefore, communication and responsibility of all members is important. When systems are designed, the time period allocated for their design and deployment is most often fixed and seldom realistic.

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[583] Dansky, K. H., Thompson, D., Sanner, T. (2006). A framework for evaluating eHealth research. *Evaluation and Program Planning*, 29(4): 397–404.

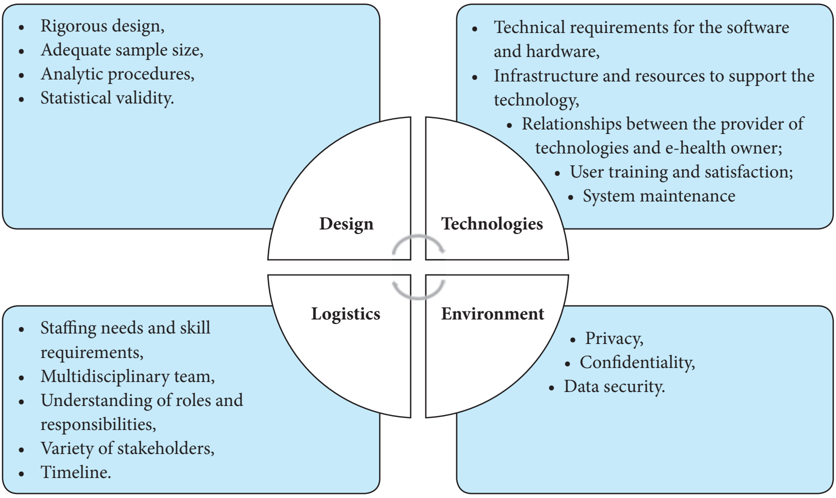

Figure 6.1. Structured four-dimensional e-health system evaluation scheme[584]

Stakeholder roles of the e-health system. Specific stakeholder roles are of considerable interest to researchers. The list of stakeholders is subject to constant updating and more detailed classification. The key stakeholders are discussed below.

Within ***medical staff***, two major stakeholder groups are distinguished: doctors and nurses. These groups are likely to have the strongest impact on e-health solutions. It is true that their needs are at times even forgotten or underestimated in their importance[585, 586, 587, 588], treating the needs of other stakeholder groups as superior. Most often the role of medical staff competes with the role of patients – this seemingly strengthens the focus

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[584] Dansky, K.H., Thompson, D., Sanner, T. (2006). A framework for evaluating eHealth research. *Evaluation and Program Planning*, 29(4): 397–404.

[585] Garman, A.N., Leach, D.C., Spector, N. (2006). Worldviews in collision: Conflict and collaboration across professional lines. *Journal of Organizational Behavior*, 27(7): 829–849.

[586] Bhattacherjee, A., Hikmet, N. (2007). Physicians' resistance toward healthcare information technology: A theoretical model and empirical test. *European Journal of Information Systems*, 16(6): 725–737.

[587] Jensen, T.B., Aanestad, M. (2007). Hospitality and hostility in hospitals: A case study of an EPR adoption among surgeons. *European Journal of Information Systems*, 16(6): 672–680.

[588] Fratantuono, M.J., Sarcone, D.M. (2008). Clear, strong, and balanced links among environment, culture, and strategy: The case of a successful nonprofit community hospital. *Strategic Management Review*, 2(1): 23–43.

on patients and raises them in importance as the only customers of e-health services.

Administrators of a health care institution may be identified as the third stakeholder group. Quite often they have completely different needs, expectations and follow entirely different values than doctors or nurses[589]. In addition to direct expectations that e-health services facilitated medical treatment processes, administrators expect the new technological systems to compile, monitor and subsequently also analyse the data suitable for management purposes. Such need emerges when administrators become responsible for their day-to-day functions for quality assessments of the services provided by the institution. They encounter interpretations in legal regulation and external pressure to implement some functions of their institution on a new level more often than medical staff. Such additional goals of administrators also extend the directions of e-health development[590].

The internal stakeholders of health care institutions, to a greater or lesser degree, are known and knowable; external stakeholders, such as ***IT service providers*** and consultants are less known[591]. IT solutions are becoming more and more complex, their applications diversify while the internal resources of health care institutions to hire IT specialists are limited, resulting in a vital need to co-operate with external IT service providers, acknowledging them as stakeholders. Unfortunately, sometimes health care institutions expect only technical solutions from IT service providers – only the implementation of pre-defined tasks. They are no longer expected to offer creative solutions to problems. Hence, they are not involved in e-health processes[592] and only follow instructions[593].

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[589] Dhillon, G. (2005). Gaining benefits from IS/IT implementation: Interpretations from case studies. *International Journal of Information Management*, 25(6): 502–515.

[590] Ramanujam, R., Rousseau, D. (2006). The challenges are organizational, not just clinical. *Journal of Organizational Behavior*, 27(7): 811–827.

[591] Blake, R.T., Massey, A.P., Bala, H., Cummings, J., Zotos, A. (2010). Driving health IT implementation success: Insights from The Christ Hospital. *Business Horizons,* 53:131–138.

[592] Aubert, B. A., Barki, H., Patry, M., Roy, V. (2008). A multi-level, multi-theory perspective of information technology implementation. Information Systems Journal, 18(1): 45–72.

[593] Somers, T., Nelson, K. (2001). The impact of critical success factors across the stages of enterprise resource planning implementations. Proceedings of the 34th Hawaii International Conference on System Sciences, Maui, Hawaii, p. 1–10.

One more significant stakeholder group is patients. As the whole health policy has already been geared towards patients as a result of understanding that only patients may evaluate the quality of health services, all models for health care delivery are based on patient needs by involving patients in decision-making[594]. It is also sought to create such e-health system modules which would help patients become responsible for their health through engagement into health promotion processes and empowering them in self-management[595, 596].

Irrespective of a broad range of stakeholders and their well-pronounced interests, there are rather distinct differences among the stakeholders in terms of their understanding of their own roles in e-health processes; in addition, data and knowledge exchange is constrained by various external factors, such as geographical and social distance. This interferes with a meaningful dialogue and mutual understanding in setting e-health development goals and selecting implementation instruments[597], irrespective that there is sufficient evidence to demonstrate that those organisations which make effort to get to know their stakeholders and later engage them in the production of the output sought, achieve higher performance results and enhance their performance efficiency[598], and the result achieved is understood as an outcome of co-production[599].

Integrating the parameter of stakeholders into performance monitoring. If a contribution of stakeholder activities into an effective development of the e-health system is as significant as described above, the

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[594] Dansky, K. H., Thompson, D., Sanner, T. (2006). A framework for evaluating eHealth research. *Evaluation and Program Planning*, 29(4): 397–404.

[595] Chatterjee S, Price A. Healthy living with persuasive technologies: framework, issues, and challenges. J Am Med Inform Assoc 2009;16(2): 171-178.

[596] van Gemert-Pijnen, J.E., Nijland, N., van Limburg, M., Ossebaard, H.C., Kelders, S.M., Eysenbach, G., Seydel, E.R. (2011). A Holistic Framework to Improve the Uptake and Impact of eHealth Technologies. *J Med Internet Res*, 13(4): e111.

[597] King, G., O'Donnell, C., Boddy, D., Smith, F., Heaney, D., Mair, F.S. (2012). Boundaries and e-health implementation in health and social care, *BMC Medical Informatics and Decision Making,* 12(100): 1–11, [online], http://www.biomedcentral.com/1472-6947/12/100.

[598] Moynihan, D.P., Pandey, S.K. (2010). The big question for performance management: Why do managers use performance information? *Journal of Public Administration Research and Theory, 20*(4): 849–866.

[599] Jackson, P.M. (2011). Governance by numbers: What have we learned over the past 30 years? *Public Money and Management,* 31(1): 13–26.

inclusion of stakeholders should become an integral part of the object of monitoring of an e-health performance. A decision as to what indicators should be monitored is facilitated by a participatory model which highlights the preconditions and opportunities for stakeholder involvement[600] while its "substantial core is the area of operation of interests, the place of actions where various, most often highly different and initially strongly competing interests intersect or meet" (**Figure 6.2**).

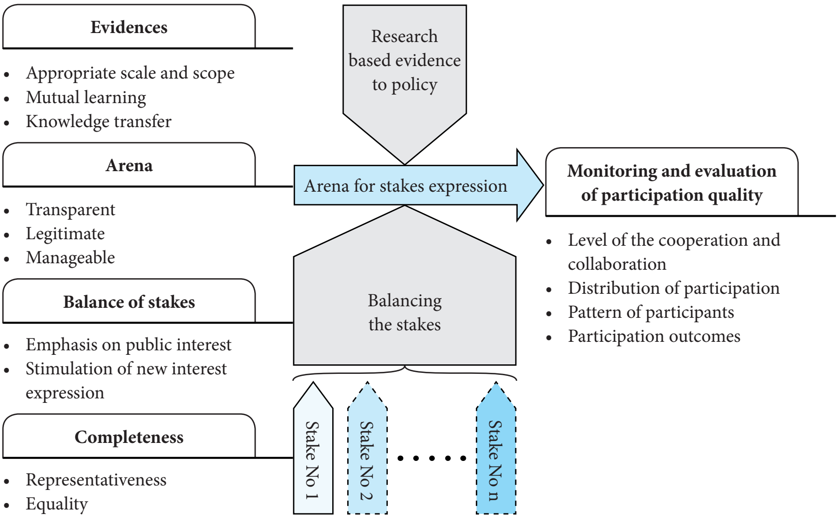

Figure 6.2. Participatory decision-making model[601]

The participatory model joins together:

- **Arena for stake expression**
  which is characterised by *transparency* (possibility for stake expression at each stage of development and search for solutions), *legitimacy* (announcement and application of general rules applied for

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[600] Mikulskienė, B., Pitrėnaitė, B., Jankauskienė, D. Augaitė, V. 2013. Interest Representation at Institutions of Public Governance: Comparative Study of Participatory Groups in Education and Science and Health Sectors. Vilnius: Mykolas Romeris University, 299 p. ISBN 9789955195610.

[601] Mikulskienė, B., Pitrėnaitė, B., Jankauskienė, D. Augaitė, V. 2013. Interest Representation at Institutions of Public Governance: Comparative Study of Participatory Groups in Education and Science and Health Sectors. Vilnius: Mykolas Romeris University, 299 p. ISBN 9789955195610.

interest management) and *based on management procedures* (the institution responsible for engagement will make adequate efforts to involve groups representing all interests and will be obligated to so at a pre-defined time).

- **Completeness of stake representation**
  which is characterised by *representativeness (*requirement to involve as many interest groups as possible in order to reduce the fragmentation in interest representation), and *equality (*all interests are treated equally without prioritising any interests over others).
- **Balance of stake representation**
  which is characterised by such categories as *an emphasis on the public interest (*specific effort to delimitate public and individual stakes), *effort to look for new interests (*most often only evolving and not perceived in societal groups).
- **Use of research-based evidence**
  which is characterised by *adequate uptake of research-based evidence* and *mutual learning* (may effectively take place as a result of access to the existing set of evidence when the evidence presented interactively becomes relevant and pertained to the balancing of stakes).
- **Monitoring of participation quality**
  which is characterised by *nature of participation (*composition of the stakeholders involved in the processes) and *definition of a participation result (*a new understanding of own stake, new knowledge of the stakes of others, building trust between confronting sides, commitment to implement the agreements reached).

The monitoring of participation quality, in particular, requires integrating an analysis of stakeholder roles.

6.2. Methodology

Data. Empirical information is necessary in order to get to know stakeholders. There are two stakeholder cognition strategies. One of them is based on qualitative research. Research starts from a few well-known stakeholders who are interviewed to find out their view of themselves as stakeholders and, at the same time, of other stakeholder organisations and persons known to them. The stakeholders found during the first research stages are then added to the research. It is repeated until their circle become finite and leads to no new information. This methodology is used by well-known methods such as focus groups, semi-structured interviews, snowball sampling, interest-influence matrices, Q methodology[602]. Another stakeholder investigation strategy is based on documented information referring to process participants – a formal network is reconstructed in this way. Such a formal network reflects relations among institutions[603]. E-health participants are considerably well represented in e-health development projects. Project-based funding of e-health is useful because of two considerations. On the one hand, it helps build e-health elements according to first necessity priorities and raise funding only for those system elements which are likely to have a meaningful impact on the system. On the other hand, project-based management facilitates time and fixed budget management through a commitment to achieving pre-defined results at the end of the project. Whereas e-health development is an expensive and complex activity, requiring considerable investment in time and finance, almost all e-health achievements in Lithuania have been made within the framework of target funding through target investments from the EU structural support or other sources. In very few cases, health care institutions made effort to create some less complex parts of the e-health system from their own funds but such initiatives were one-off and small scale. It should be borne in mind, however, that it was possible only for very strong health care institutions. Hence, the selection of the participants in EU structural support projects for social network analysis will not result in a significant bias.

For the purposes of the research, all e-health projects implemented between 2007 and 2013 were collected. The companies and organisations taking part in them may be referred to as the stakeholders who may play a different role in each project – a co-ordinator in one project may be a partner in another. Regional hospitals will be analysed as one stakeholder group because of their unified role in e-health projects. Together with regional

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[602] Reed, S.M., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., Prell, C., Quinn, C.H., Stringer, L.C., (2009). Who's in and why? A typology of stakeholder analysis methods for natural resource management. *J. of Env. Manag.*, 90: 1933–1949.

[603] van Egeraat, Ch., Curran, D. (2010). Social Network Analysis of the Irish Biotech Industry: Implications for Digital Ecosystems. Digital Ecosystems. *Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering*, 67: 31-43.

hospitals, 40 organisations were involved in the projects overall. The whole list of e-health projects is available in **Table 6.1**.

Following the rules of allocation of EU structural support, coordinators and partners of these projects are health care institutions or government-appointed institutions involved in policy implementation or supervision or tasked with the delivery of specific services. E-health development and implementation services are purchased by means of public procurement. These services are provided by private capital companies which specialise in IT services. Information about e-health projects and project participants is publicly available and has been collected from the public EU assistance website. Information about other project contributors who had been selected by public procurement procedures has been gathered from official reports on public procurements. The research sample also includes unsuccessful participants who had participated in public procurement procedures – information about existing but unrealised interests has been collected in this way.

Table 6.1. List and classification of e-health project participants, 2007–2013.

	Organisation	Core business	Status	Main role
1.	UAB JOSTRA	IT	Private capital company	IT service provider
2.	UAB Informacinės konsultacijos	IT	Private capital company	IT service provider
3.	UAB IO projects	IT	Private capital company	IT service provider
4.	UAB CIVITTA	IT	Private capital company	IT service provider
5.	UAB Santa Monica Networks	IT	Private capital company	IT service provider
6.	UAB S4ID	IT	Private capital company	IT service provider
7.	UAB ERNST AND YOUNG BALTIC	Consultations	Private capital company	Consultations
8.	UAB Investiciniai projektai	Consultations	Private capital company	Consultations

	Organisation	**Core business**	**Status**	**Main role**
9.	UAB Price Waterhouse Coopers	Consultations	Private capital company	Consultations
10.	UAB TOWI	IT	Private capital company	IT service provider
11.	Metasite Business Solutions, UAB	IT	Private capital company	IT service provider
12.	UAB GLIMSTEDT	IT	Private capital company	IT service provider
13.	UAB Webmedia	IT	Private capital company	IT service provider
14.	AS Webmedia (Estonia)	IT	Private capital company	IT service provider
15.	UAB ERP	IT	Private capital company	IT service provider
16.	UAB Sintagma	IT	Private capital company	IT service provider
17.	UAB ALGORITMŲ SISTEMOS	IT	Private capital company	IT service provider
18.	UAB ATEA	IT	Private capital company	IT service provider
19.	UAB AFFECTO LIETUVA	IT	Private capital company	IT service provider
20.	Daekyo CNS Co. Ltd (Soth Korea)	IT	Private capital company	IT service provider
21.	UAB Tieto Lietuva	IT	Private capital company	IT service provider
22.	Tieto Latvia, SIA (Latvia)	IT	Private capital company	IT service provider
23.	UAB PUBLICUM	Consultations	Private capital company	Consultations
24.	UAB Avenire	IT	Private capital company	IT service provider
25.	Ministry of Health	Ministry	Public authority	State regulation

	Organisation	Core business	Status	Main role
26.	Vilnius University Hospital Santariškių Klinikos	Hospital	Budgetary institution	Health care institution
27.	Hospital of Lithuanian University of Health Sciences (LUHS) Kauno klinikos	Hospital	Budgetary institution	Health care institution
28.	Regional hospitals	Hospital in a region	Budgetary institution	Health care institution
29.	Public institution Clinical Hospital of Kaunas	Hospital in a region	Budgetary institution	Health care institution
30.	Centre of Registers	Registration services	Budgetary institution	Public services
31.	VšĮ University Hospital of Kaunas	Hospital	Budgetary institution	Health care institution
32.	VšĮ Hospital of Vilnius University Žalgirio klinikos	Hospital in a region	Budgetary institution	Health care institution
33.	VšĮ University Hospital of Vilnius City	Hospital	Budgetary institution	Health care institution
34.	VšĮ National Hospital of Šiauliai	Hospital in a region	Budgetary institution	Health care institution
35.	VšĮ Klaipėdos jūrininkų ligoninė	Hospital in a region	Budgetary institution	Health care institution
36.	Lithuanian Medical Library	Library	Budgetary institution	Public services
37.	VšĮ Centro poliklinika	Hospital	Budgetary institution	Health care institution
38.	Ministry of Transport and Communications	Ministry	Public authority	State regulation
39.	Lietuvos paštas	Post	State enterprise	Provider of postal services
40.	State Health Care Accreditation Agency	Accreditation agency	Budgetary institution	Supervisory institution

Methods. During the initial stage of analysis the organisations involved in e-health projects were grouped by the functions they had in the projects (e.g., IT services, consultations, regulation), by a core business area (e.g., ministry, IT, etc.) and by the type of capital (e.g., private company, budgetary institution). Such classification of the stakeholders made it possible to outline their main roles in the process.

The research of stakeholder roles was carried out according to the method of social network analysis (SNA) using a software package for the analysis of networks UCINET; the visualisation of networks was done using NetDraw[604]. Social network analysis reconstructs the existing relations among network members and, hence, helps explore the established co-operation practice among the stakeholders. In addition, the analysis of the length of network relations makes it possible to identify what roles the stakeholders assume in the network and project or what roles are assigned to them by the members dominating in the network. Two-mode networks were formed from which one-mode networks were then formed for research purposes.

The mutual affiliation between projects and project participants is used to reconstruct a two-mode network on the basis of two-mode (participant–project) affiliation of the network members where one and the same member is linked to all projects where it participates[605]. Two-mode affiliation networks are most often reproduced from documents and represent the whole network without any network fractures caused by unavailability of information as it is often the case where the snowball method is used to reconstruct the networks of social relations. Whereas the network under observation is formal, more detailed analysis of the stakeholders is impossible and this research analyses institutional stakeholders.

Thus, the e-health network has been formed from 19 projects and 40 participant organisations. Although initially a social network was formed as a two-mode network, it was transformed after examination into a one-mode network where the stakeholders are linked among themselves rather than to projects. The further analysis focuses on the parameters of a one-mode network.

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[604] Borgatti, S., Mehra, A., Brass, D. and Labianca, G. (2009). Network Analysis in the Social Sciences. *Science*, 323(5916): 892 – 895.

[605] Borgatti S.P., Everett M.G. (1997). Network analysis of 2-mode data. Social Networks, 19(3): 243–269.

6.3. Social network analysis: expression of stakeholder co-operation

The SNA of e-health projects and stakeholders aims at revealing publicly undisclosed affiliations which may determine the formation of co-operation and its dynamics in future as well as impact the course of e-health development. The two-mode network is also called the affiliation network and it is formed between two different units, i.e. between projects and stakeholders. Such network expression enables discovering those central network nodes which are prone to co-operating within the framework of one project and have a higher potential for transferring the knowledge accumulated in one project to another project and communicating the knowledge among other project members, forming stronger and closer ties with a larger number of network members. Thus, the two-mode network provides more information for interpreting the nature of the relations formed by the network members because, in addition to direct relations of the members, the researchers may also trace back the reason of such relations (participation in one or another project). The two-mode e-health network is shown in **Figure 6.3**. Red circles symbolise projects while blue squares are used to mark the stakeholders – project participants.

The initial analysis of the participants shows that there is a rather broad range of participants in the projects. The projects involve the institutions with state regulation and co-ordination function (e.g., ministries), supervisory institutions (e.g., accreditation institution), business (IT companies) as their participants.

The overall analysis of the network shows that there are at least two participants per project – one coordinator and one service provider. It is true that there were only three projects with only one or two participants during the research period. The links between the nodes show that in these specific cases no additional offers were received from IT market players during the procurement procedures – the services were bought based only on one offer. It is noteworthy that these three projects were implemented in regions where it was likely that there was no competition in IT service offers because of low supply. In other cases, there were more project participants as well as candidates interested in procurement procedures. The network analysis has also shown what strategy was followed by the service

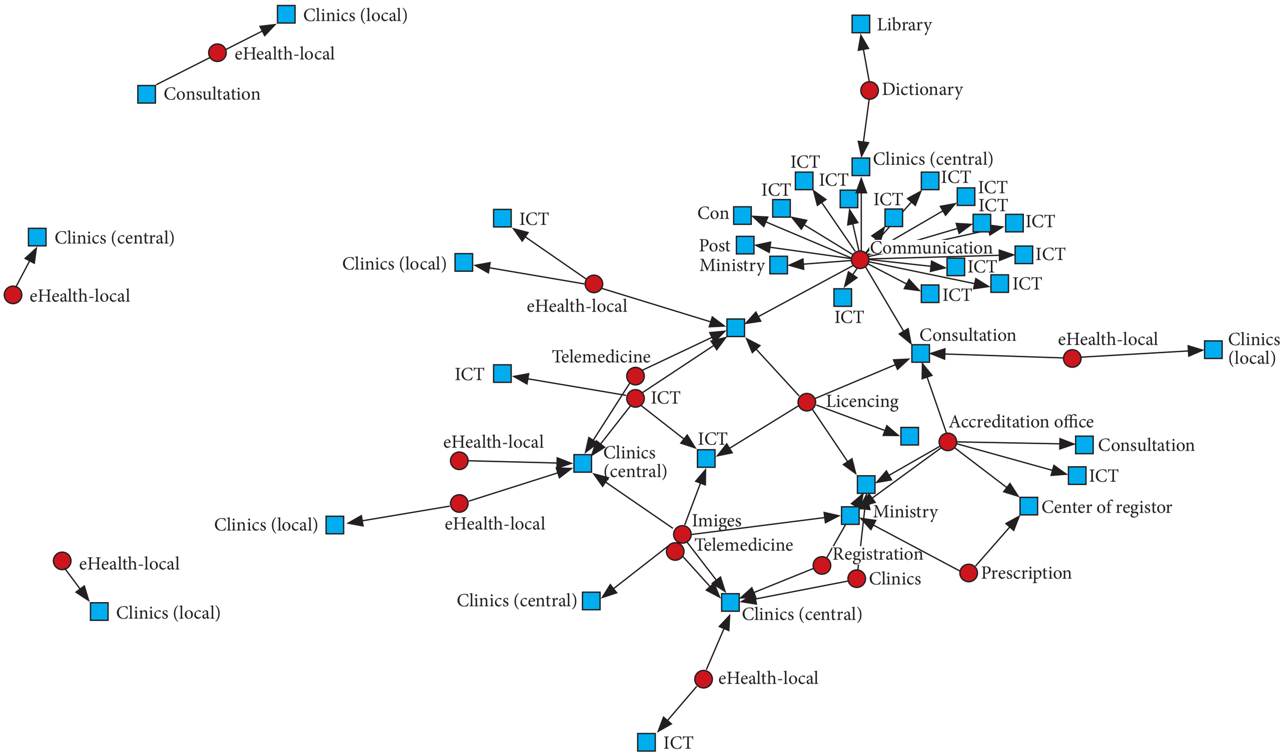

Figure 6.3. Two-mode network of e-health system development projects and project participants, 2007–2013 (red circles symbolise projects while blue squares are used to mark the stakeholders – project participants)

providers making effort to take part in public procurement procedures. The IT service providers normally formed consortia and participated in procurement procedures as a group of two or three companies. Hence, the network is enough to show that the companies operating in e-health area seek to minimise potential competition on the market by forming consortia in order to eliminate other potential providers of e-health services from the competition.

The analysis of the two-mode network also entailed principal component analysis. This analysis calculates distances between the nodes and visually groups them into clusters according to the distance of the nodes (groups them by characteristic attributes – behaviour similarities and differences). The nodes in the same proximity take the same spatial position and form hubs. **Figure 6.4** highlights one concentrated participation space taken by the project "Development of the delivery system of electronic notices and electronic documents to natural persons and legal entities (E-Delivery System)". It generated an incredibly high interest from business companies. This project is implemented by the Ministry of Transport and Communications, and the Post and Centro poliklinika (Central Polyclinic) are participant partners. Most interestingly, the companies that took an active part in the public procurement procedures of this project have not demonstrated a similar interest to any other e-health project. Only two companies interested in this project have also been successful in other projects.

The competition by IT companies is either low or has disappeared as it can also be well seen from the network periphery. Local e-health projects are implemented by one specific company that has no need to form a consortium and co-operate with other companies. And it is rather strange that the companies operating in the periphery do not have any other links with any of the projects implemented over the seven-year period. This trend may imply considerable risks. One of them is that where a company is involved in one single project it is unaware of the success and failures encountered in similar projects. It also has limited knowledge of how such problems have been solved or resolved. Such companies have to learn from themselves unless it is expected that project coordinators have sufficient experience in the implementation of such projects.

This network visualisation also shows that the above-referred project appeared interesting to market players. It is also seen that two business companies (one of them is consultant company) holds a rather distinct co-coordinating role in the network while all other projects and their participants share the same network space thereby evidencing their similarity.

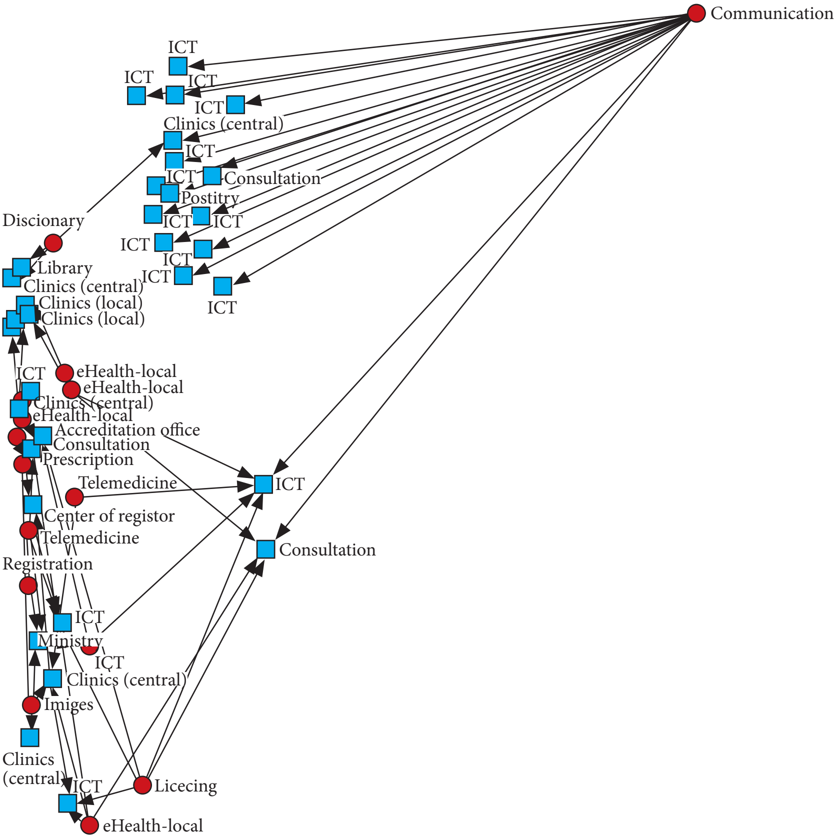

Figure 6.4. Visualising the two-mode network of e-health system development projects and project participants under the method of principal component analysis, 2007–2013

More detailed characteristics of mutual relations of the stakeholders (nodes) active in the network may be revealed by a one-mode network of the stakeholders. Hence, as a second step the two-mode network was transformed into a one-mode co-affiliation network. All general network parameters were then calculated for this network, *inter alia*, centrality, closeness, betweenness.

The multiple statistics of the network parameters (**Table 6.2**) and the network visualisation make it possible to examine the distribution of roles of the e-health stakeholders.

Table 6.2. Multiple statistics of parameters of the one-node network of e-health system development project participants, 2007–2013

	Network parameters	Value
1.	Avg Degree	10.75
2.	H-Index	18
3.	Density	0.275641
4.	Components	4
5.	Component Ratio	0.076923
6.	Connectedness	0.808974
7.	Fragmentation	0.191026
8.	Closure	0.889704
9.	Avg Distance	1.900159
10.	SD Distance	0.810695
11.	Diameter	5
12.	Breadth	0.48735
13.	Compactness	0.51265

The main network parameters are discussed and explained below.

- **Social network parameter – network density** shows what part of all possible network ties are active. This parameter may characterise the quality of communication in the network: the dissemination of information by the network is possible only if all nodes are tied. If any of the nodes has no ties, it remains excluded from information. Another marginal case is several network nodes linked with another network node by more than one relation. Such nodes become a communicator of information. The more nodes are tied by more than one relation, the denser the network and the easier is information flow within the network. The analysis of the networks formed by e-health projects shows a rather low value of network density – only 0.28. It should not be highly surprising because, on the one hand, this specific value is determined by the principle of network formation – the project is awarded to one applicant and one or several IT companies to provide IT services, hence, co-operation includes only them. On the other hand, a small number of potential relations also shows a deliberate wish to isolate others or get isolated – as each procurement contract is awarded to a different company, the majority of network members has no interconnection. This means that information about the processes taking place in one project has no opportunities to be communicated to the participants of another project.

- **Components**. The network statistics shows that a distinction may be made of four network components where network members behave similarly and they all are linked by relations within a particular element. One network component is the centre, i.e. several major projects with the same institutions and companies as participants; another network component is the network periphery, i.e. several projects where a local company and a hospital is involved. Other components are diffused between these two boundary conditions.
- **Component Ratio**. This parameter is equal to one when all network nodes are isolated and equal to zero when there is only one component in the network. The component ratio of the e-health network is 0.07; it is an indication that there is no dominance of isolated members in the network but one component almost covers the whole network. It means that one of the network components characterises the statistically prevalent behaviour of the nodes.
- **Network Closeness.** This parameter shows how close each network node is in relation to another (or node friends and friends' friends). It means that all members of a network with a high degree of closeness are linked and none may avoid the impact of another member or hide from the network members. One the one hand, it increases the quality of information sharing and, on the other, creates more trust in the network members. The network closeness of the e-health network is rather high, suggesting that individual network components share information rather well, excluding others.

- **The diameter and Geodetic Distance.** Diameter is the maximum geodetic distance between the nodes. The diameter of the e-health network is 5. Hence, five steps are necessary in order to get across the whole network. Geodetic distance, however, is 1.9 – it is a rather short distance, showing that two steps are required in order to reach any member of the network.

The one-mode network was also subject to principal component analysis (**Figure 6.5**). A very clear distinction may be made of two network sectors: we can observe a concentration of health care institutions in one sector and a dominance of IT companies in the other sector. Two nodes stand out by the density of their relations in this group – one of the nodes is a consulting company.

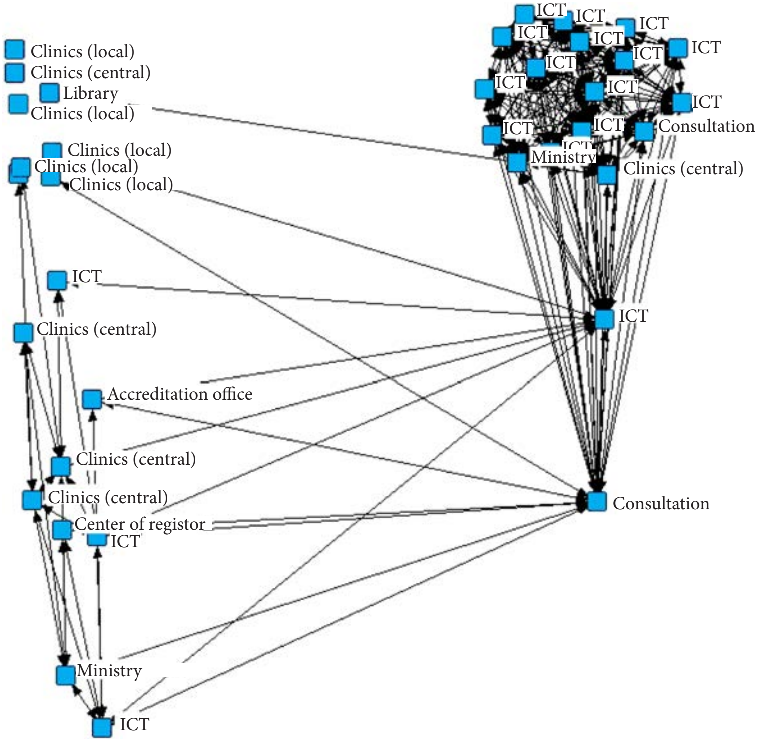

Figure 6.5. Visualising the one-mode network under the method of principal component analysis

This analysis is supplemented by the analysis of such parameters as closeness, betweenness, and centrality.

Centrality. Centrality is an indicator of each network node which shows how many relations a specific node has with other nodes. The higher the degree of centrality, the more influential this node is in relation to other nodes. Closeness centrality is also a node characteristic to indicate how close a specific node is to other network nodes. Most often the closest node is a good communicator and its relations with other network members are the closest – they are linked by the closest proximity. The lower the value of this indicator, the longer the relational distance of the node from the network member with the highest impact. Four key network players may be clearly distinguished in the e-health network (**Figure 6.6**). They are one of the largest hospitals in Lithuania, Hospital of Vilnius University Santariškių klinikos, Centro Polyclinics of Vilnius City (one of the most active polyclinics in e-health development) and two business companies, one of which is a consulting company.

Betweenness centrality shows the position of one node in relation to other nodes in the network. The higher the value, the more intense the information flow which passes through this node to other nodes. And conversely, a low value indicates a peripheral position of the node and it means the information is not communicated through it to other places in the network and is only limited to that node. Such position in the network ensures a mediator's role for the node. The e-health network shows (**Figure 6.7**) that the betweenness values of all nodes are more or less comparable and reach a similar absolute value in the group of each stakeholder, e.g. for health care institutions or IT companies. Nevertheless, the network betweenness values show that the health care institutions are the primary members of the network (the highest values of betweenness), they capture information and share it while the majority of IT companies takes peripheral positions in the network. Such network configuration is determined by the project formation principles and conforms to the concept of public interest in e-health. The company, which is awarded a procurement contract, works with the health care institution during the whole project time and no new participants join in. Even attempts to win similar projects fail.

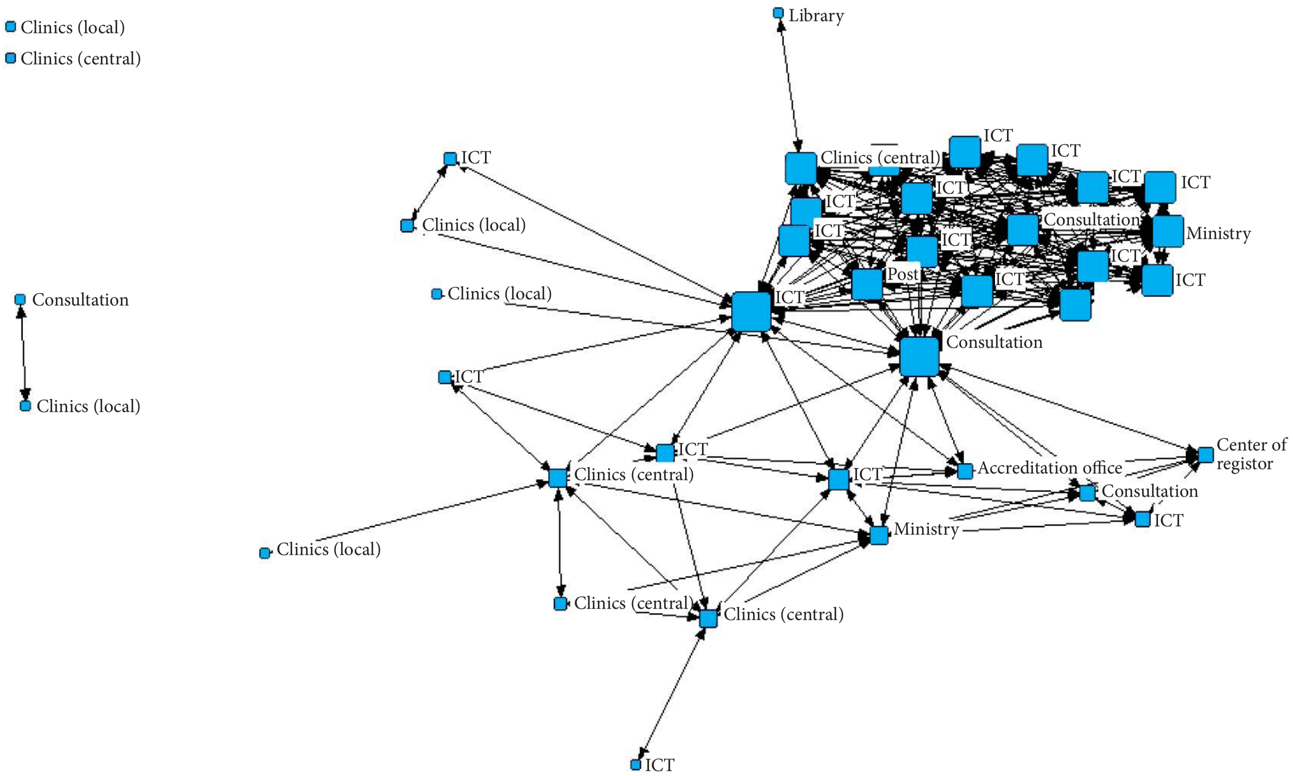

Figure 6.6. Visualising the one-mode network by pinpointing the centrality parameters of the network nodes. A node size corresponds to the value of the centrality parameter.

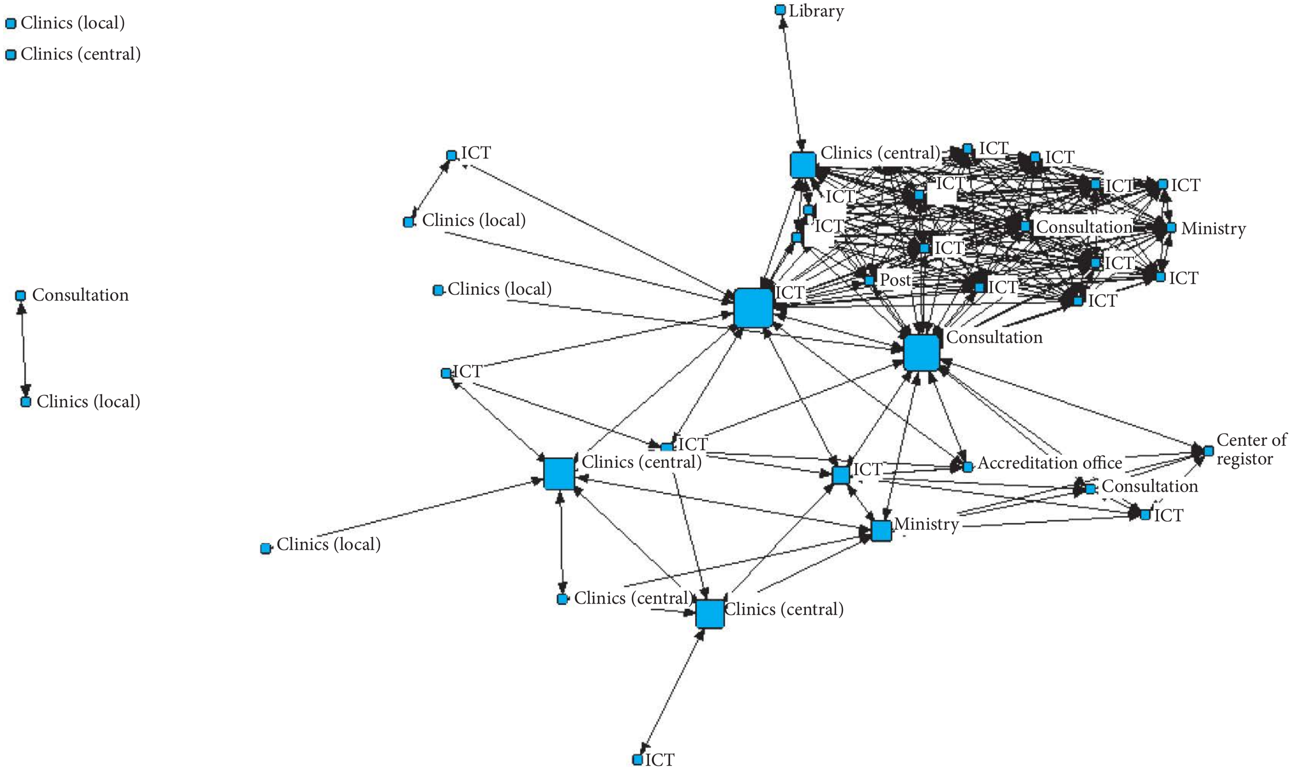

Figure 6.7. Visualising the one-mode network by pinpointing the betweenness parameters of the network nodes. A node size corresponds to the value of the betweenness parameter.

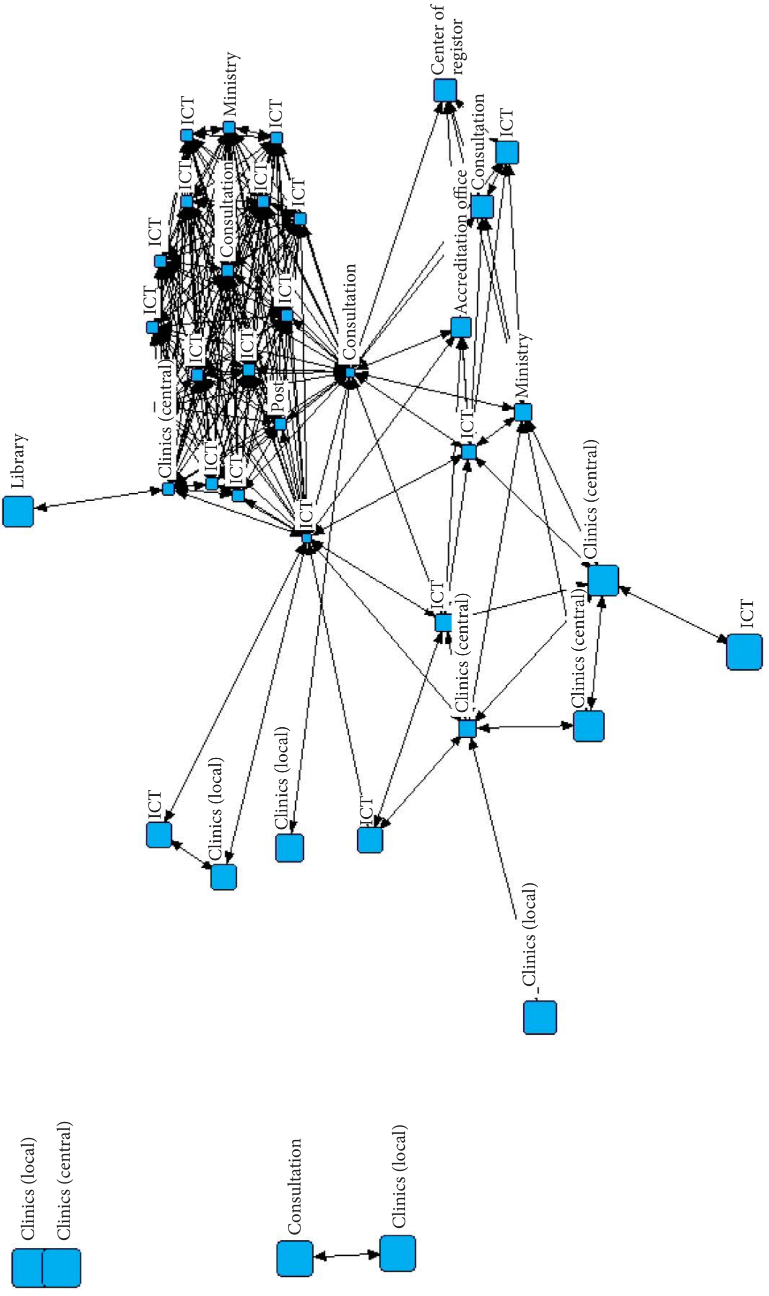

Figure 6.8. Visualising the one-mode network by pinpointing the closeness parameters of the network nodes. A node size corresponds to the value of the closeness parameter.

The research of closeness (**Figure 6.8**) shows that the highest closeness is demonstrated by an IT company and a consulting company, which link the most important network members, such as the clinics and polyclinic. They also have rather dense relations with other members of the network.

6.4. Most distinct stakeholder roles of the e-health system development: a mediator and the society

The network visualisations of both the two-mode and one-mode networks represent the same network characteristics. Some IT companies (although a minority) are more involved/engaged in e-health projects and more aware of e-health issues in Lithuania and its general situation, get more experience for other cases of participation. It is slightly surprising and triggers a wish to find out why the organisation with the highest centrality is a provider of financial and other consultations rather than IT services. A deeper analysis reveals that most likely such companies undertake a mediator's role in e-health projects and seem to bring the health care institutions and IT companies together and in this way mobilise the stakeholders who speak different languages to get to know commonly sought objectives.

On the other hand, such role of a consulting company may be slightly risky, in particular, when the company takes such a distinct central role in the network. This situation may have several implications. Firstly, the true interests may be covered and concealed by other activities. Hence, the true interests can be distorted and represented to a wrong extent. Secondly, it may generate a long chain for getting to know the interests between the health care institutions and IT service providers. There is a risk in the implementation phase in such a case when consultants are no longer so much necessary. It is true that the results of the qualitative research have also allowed figuring out this sensitive situation as its findings revealed that some stakeholders do not get involved, rarely participate in dealing with e-health issues, are rarely met or are even unknown to other stakeholder groups. The role of consultants, however, was clearly visible to almost all stakeholders who were involved in the research; they were also aware of the consultants' activities.

Admittedly, the analysis of the stakeholder network revealed no indication of the role of the society. Project formation strategists would say that it is not strange because the society is not an implementer of the projects and may only become the customer in future – with such formation of the e-health networks, the society should not stand out as a network player. It sounds like a very logical explanation or excuse why the society does not take part in institutionalised e-health projects – projects implement strategies and resources are necessary for this work. Such explanation, however, does not correspond to the assumptions related to the involvement of stakeholders. It must be admitted that there are unequal conditions for the society to participate in e-health matters: project financing rules seem to declare that the activities and contribution of any stakeholder/project participant to the success of e-health projects should be financed, that is, the costs of his/her time and efforts should be compensated, although the society seems to be expected to participate at its own cost.

6.5. Possibilities of evaluating e-health stakeholder involvement performance

Sufficient evidence has been generated in the implementation of the second objective of the research (to integrate the methods used to get to know the stakeholders into the evaluation system of the e-health system performance by selecting the most suitable methods for this purpose) that the participatory model shown in **Figure 6.2** may be improved by adding a more tangible substance to participation quality by measuring it.

The improved model for evaluating the e-health stakeholder involvement performance is presented in **Figure 6.9.** The element of participation quality in the model may be divided into parts where one part of participation quality may be measured by the quality of social relations. Social network analysis, as an instrument to investigate participation quality, measures not only a actual formal participation of stakeholders but also the required equality, ability to influence the system, openness. The relevant list of the stakeholders, interaction between the stakeholders, formal and informal social relations reveal the stakeholder roles formed by external rules or practices during any management cycle. The analysis of social networks prompts a whole set of indicators which reflect well the complete set of stakeholder stakes through the representativeness and equality of the stakeholders. It includes the network density, compatibility, distances and the network diameter or fragmentation. The values of these indicators may

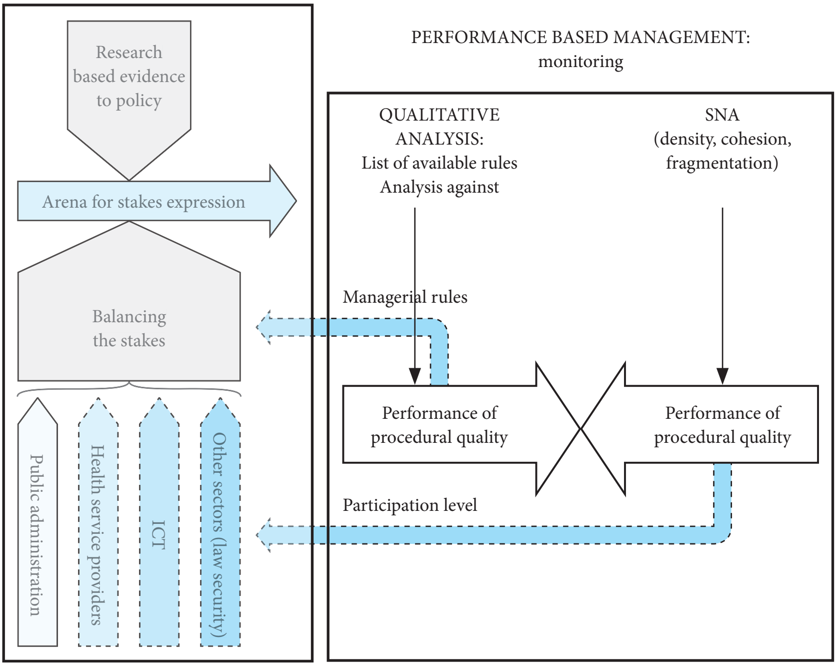

Figure 6.9. Evaluation model of e-health stakeholder involvement performance

be used in order to make decisions to improve the sought balance between the stakes. Such indicators, which may be measured in a rather clear-cut manner and represent the stakeholder roles and mutual co-operation practices as well as communication trends, may be combined even with such scientific research which is recommended by the instruments suggested by the stakeholder theory.

Together with management performance measurements (qualitative and quantitative analysis of procedures), extensive information may be collected about the developing practices of stakeholder involvement.

6.6. Summary

Within the scope of the first research objective (to carry out a study of the stakeholders active in the development and implementation of the Lithuanian e-health system and investigate their roles in the entire e-health development chain), an analysis has been made of the participants who implement the creation and development projects of the e-health system and who are attributed to e-health stakeholders by their interests.

The primary stakeholders of e-health projects are health care institutions and companies providing IT services. Public authorities and state enterprises are also rather actively involved. The participation of consulting companies is a new phenomenon in the implementation of e-health projects in 2007–2013. These companies do not provide any IT services.

The fact that project implementing hospitals and polyclinics are the central nodes of the network (highest degree of centrality and betweenness) is a positive e-health development trend – health care institutions take the ownership of the e-health product because they are the best placed to gather information about the relevant e-health needs in the shortest way.

The network of e-health system development projects reveals that IT companies act so as to reduce competition on the market: they form consortia together with consulting companies. Regional e-health projects are implemented by local companies which do not participate in any other projects and are even unwilling to show their interest (in terms of participation in any public procurement other the awarded one). Low or disappearing competition may be an indication that a very specific product is being created and at the same time signal an artificial elimination of market players.

The roles of IT companies in the networks of e-health projects in 2007–2013 have considerably changed compared to the developments in the e-health area in 2004–2006. If earlier IT companies were the key players in the formation of the contents of e-health as they were the only players who had the knowledge (they were consulted with), they only provide services and play a peripheral role in the network nowadays. The exception is several IT companies who have become the central nodes of the network and won in the competitive rivalry.

A low density of the e-health network shows a rather high degree of isolation of the stakeholders. Such configuration of the network represents a convenient place for other types of companies rather than IT service providers, for example, for consultants. It is the case in terms of the trends observed in this research. One central network player is the consulting company that plays a mediator's role which seems to help communicate for those who don't see eye to eye. At the same time, this leads to additional risks – the likelihood of a rather long interest representation chain, which moves authentic interests further away from the stake expression arena thereby also distorting the balance of stakes.

The most weakly represented stakeholder group or, more precisely, the group without any expression in the formal institutional e-health networks is the society or the patient. The fact that the efforts of other stakeholder groups in the development of the e-health system are remunerated while patients should participate at their own cost by default creates unequal participation conditions. These findings are confirmed by the developments observed in the development of e-health in Lithuania.

In summary, it may be concluded that the development of e-health by means of projects creates a competitive environment for the provision of and payment for services rather than the environment of co-operation.

Within the scope of the second research objective (to integrate the methods used to get to know the stakeholders into the evaluation system of the e-health system performance by selecting the most suitable methods for this purpose), the participatory model has been improved by adding a more tangible and measurable substance to participation quality by evaluating the quality of stakeholder involvement. This model is based on the set of one-valued measured indicators of participation quality. Such indicators are generated by social network analysis.

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7. THE e-HEALTH PLATFORM FOR STAKEHOLDER COOPERATION

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Development of the information technologies (IT) created major opportunities for a more effective information management within the healthcare, moreover that healthcare system itself generates massive flows of information. Organisation of information flows facilitates the health-related decision-making process and helps to make the most effective use of financial resources. Health information solutions become relevant not only for healthcare institutions but also for the patients and the wider society. Thus, the e-health as information management system increases the effectiveness of the health service delivery and ensures the security of the patient information. It is becoming a powerful instrument determining major transformations, i.e. it changes the traditional work principles, changes the attitude toward health resources and their management; and, finally, changes the organisational structures of health institutions; everybody, starting from the healthcare professionals to the patients and politicians become the actual users of the e-health system. At the same time, the e-health solutions created a relevant market and had significant impact on the economy, employment and innovations.

Implementation of the e-health system changes the existing systems and it is gradually becoming a central instrument facilitating daily work of health care professionals. However, the e-health implementation revealed not only technology development and usage barriers but also the need for structural reforms in healthcare organisational structures, including new political decisions, processes and financial management. Success in implementing the national e-health vision depends on the dynamic changes in governance, especially in determining the right balance between centralisation and decentralisation, and in building synergy and enhanced system transparency towards all the stakeholders[606].

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In discussing the benefits and place of stakeholder engagement in the public policy building processes, a normative prerequisite for a broader engagement is highlighted in the first place: the ones who will be directly/indirectly affected by the future solution have the right to take part in the decision-making process. Another prerequisite for stakeholder engagement is the perception that stakeholder solutions enrich the decision-making process with the new knowledge and that interaction of the participants creates a favourable atmosphere for future agreements.

Development of the e-health system requires multifunctional capacity and the knowledge of several, often different fields of science. The e-health is being developed by applying the achievements in the field of health sciences, information technology, governance, economy and political sciences. Unfortunately, despite major achievements in the sphere of integration of the scientific knowledge in the establishment of the e-health system, since 2002 not all of the e-health development attempts have been successful. Some e-health modules are still not operational, and later totally different new solutions have been sought to develop these modules. To realise new solutions the efforts have been taken to engage new institutions, which initially seemed unrelated to and not interested in the healthcare system, but they had complementary competencies. Thus, the number of the interested in the e-health has increased. Today, besides doctors, IT and public administration specialists (e.g. from the Ministry of Health), the consulting companies and the Centre of Registers, which is taking an active part in the development of a system for exchange of images and e-Prescription, have joined the e-health projects. The e-health development covers the following activities[607]:

- Development of strategies and visions (strategy in line with the national context, and the supporting plans).
- Investment (sustaining strategic priorities through adequate investment plans).
- Governance and stakeholder engagement (direct e-health coordination: process development, alignment of aims with health priorities, political support, shared achievements and cooperation with stakeholders).

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[607] WHO-ITU (2012). National e-health Strategy Toolkit. [accessed 03-09-2014]. <http://www.itu.int/dms_pub/itu-d/opb/str/D-STR-E_HEALTH.05-2012-PDF-F.pdf>.

- Compatibility between the regulatory rules and policy. Coordination of the national strategies, the establishment of the legal framework, assessment of the compliance with priorities).
- Staff management (networking, building cooperation, sharing e-health achievements, training programmes).
- Standardisation (standardisation of the health information exchange providing long-term information collection and use).
- Infrastructure (geographical coverage of health institutions through the IT infrastructure).
- Applicability of services (availability management, a collection of information, content functionality).

The majority of the enlisted activities have been pursued quite successfully, including the regular update of strategies, allocation of substantial funds, establishment of an extensive legal framework aimed to standardise the e-health products, investment distribution between the infrastructure, and development of staff competencies. However, some management elements are still undocumented and non-regulated, e.g. the content of the process and methods for stakeholder engagement.

This chapter seeks to establish the electronic platform promoting stakeholder engagement and cooperation aimed to build the interaction between the e-health stakeholders and ensure a real-time problem-solving.

The aims of this chapter are:

- to determine the position of the e-health system in the context of health innovations;
- to provide an overview of the prevailing paradigms in management science that may justify platform elements aimed to increase the engagement in the e-health development;
- to justify the importance of stakeholder engagement;
- to develop a participation/engagement model which could justify the structure of the e-health platform for stakeholder cooperation;
- to suggest political, governance and organisational measures aimed to increase the stakeholder engagement.

7.1. Current healthcare management trends affecting the e-health development

Patient-centred healthcare. One of the main healthcare development trends is the patient-centred healthcare. According to the description provided by Grin in 1994, it is a mutual cooperation between the patient and the surrounding environment (family, friends, doctors and other healthcare professionals) directed toward the effective treatment and recovery. This aim could be achieved only via joint and collaborative team efforts, patient education, and knowledge sharing[608].

In the healthcare system, the concept *patient* is being replaced by the concept *person* since the *person* becomes part of a long process and healthcare model, starting from a healthy lifestyle, diseases, and their prevention. Therefore, healthy persons must have access to and be able to manage personal health resources (nutrition and physical activity habits, life quality standards, disease prevention, genetic predisposition)[609]. In view of this, the patient-centred healthcare concept has been replaced by a slightly amended attitude toward a person who is not necessarily a *patient* using healthcare services. Thus, when speaking about the people-centred healthcare it is necessary to highlight its main elements[610]:

- Culture of care and communication (healthcare users being informed and involved in decision-making and having choices; providers showing respect for their privacy and responding to the needs in a holistic manner.
- Responsible development of services, responsive and accountable institutions (providing affordable, accessible, safe, ethical, effective, evidence-based and, most importantly, holistic healthcare.
- Supportive healthcare environments (putting in place appropriate policies and interventions, positive care and work environments, strong primary care workforce, and mechanisms for stakeholders' involvement in health services planning, policy development, and feedback).

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[608] Grin, O.W. (1994). *Patient-centered care: Empowering Patients to Achieve Real Health Care Reform*. Michigan Medicine, 93: 25-29.

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[610] WHO. (2007). People-centred Care. A policy framework. p. 1-28.

Although the concept of people-centred healthcare was formulated long time ago, it is still difficult to realise it in practice. For instance, no agreement has been reached yet on the final number of elements and their definition; politicians and healthcare professionals are still facing difficulties in switching between "cure" and "help deal with a disease"; the healthcare system is constructed differently, therefore its reorientation requires time; so far the approach toward people's lifestyle is artificially dissociated from the approach to his/her health and health promotion; collaboration of the support systems is still weak, and no agreement has been reached yet on what information can/should be provided to the patient; patient engagement and empowerment are discussed in theory but not in practice[611].

The healthcare paradigm directed toward a healthcare subject also has significant impact on the development of the e-health, moreover that the e-health development can contribute to rapid healthcare framework transformations. This paradigm imposes an obligation on the healthcare system to develop the IT-based systems enabling the patients to select service delivery methods and providing access to health resources[612]. Through its innovative nature, the e-health has the capacity of empowering the patients to play greater roles in their own health and select the most appropriate services.

Integrated healthcare. The Integrated healthcare seeks to meet personal needs outside a healthcare institution by facilitating the daily work of a healthcare specialist. The integrated healthcare system covers the personal healthcare, tele-health and tele-care[613]. The integration content is directed toward the individual/patient and his/her needs by supplementing healthcare services and their coordination with relevant information, better communication and cooperation and by eliminating the surplus diagnostic tests.

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Functioning of an integrated healthcare system depends on a set of factors[614]:

- Health service organisation aimed to ensure continuity of healthcare;
- Governance mechanisms;
- Strategic commitments;
- Financial and support systems;
- Level of funding;
- Excellence in information systems;
- Patient-focus;
- Engagement of specialists.

Engagement of an individual (patient). The people-centred healthcare is realised only by enabling the persons to be active participants in their lives, health, and healthcare. Active engagement is pursued via involvement of an individual in decision-making providing for a selection of treatment strategies, continuous studies on own health, treatment technologies and healthy lifestyle, and self-health management. Engagement of an individual becomes an instrument in realising the goals of the healthcare development. Engagement redistributes the responsibility between the healthcare professional and the patient and provides more opportunities for implementation of the decision. Possessiveness of the decision becomes a crucial factor determining *other behaviour changes*[615].

Teamwork. Cooperation pursued by joint efforts of various specialists has become another mechanism for reallocation of responsibility[616]. The patients have access to their own medical data and, in addition to comments and explanations of the professionals, are provided with the extensive information relevant for health-related decision-making.

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[614] Villalba, E., Casas, I., Abadie, F., Lluch, M. (2013). Integrated Personal Health and Care Services deployment: Experiences in eight European countries. *International journal of medical informatics,* 82(7):626-635.

[615] Calvillo, J., Roman, I., Roa, L.M. (2013). Empowering citizens with access control mechanisms to their personal health resources. *International journal of medical informatics*, 82(1): 58–72.

[616] Kudukytė-Gasperė, R., Jankauskienė, D. (2014). The Integrated Health Care Services: People-Centered Health Care in European Region. Health policy and management, 2(7): 113–133.

Personalised healthcare. The paradigm of personal healthcare shapes a new attitude toward health and substantiates the need for personalised healthcare and medicine. Advocates claim that medical treatment can now be targeted on the specific characteristics of each individual, using genetic profiling to identify the particular nature of the condition, and to tailor treatment for each person.

At the same time, personalised healthcare moves from cure-based to prevention-based solutions. The latest genetic research generates the opportunity to develop specialised and focused treatment and technologies, which could prevent human illness and, consequently, the spread of disease. Personalised treatment and disease prevention could help reduce healthcare costs and increase effectiveness.

Besides positive changes, the personalised healthcare paradigm imposes some limitations, e.g. consumerization, responsibilization, and individualization[617].

- *Consumerization*: individuals view themselves as citizens as much as consumers and patients. As a consumer, an individual is free to choose the service and possible quantity of services. Meanwhile, a consumer's individual needs might be restricted by the element of citizenship when citizens of one state jointly use the available goods. Thus, a conflict arises between the consumer looking for an optimal personalised set of services and citizens showing solidarity and seeking a balance between all the consumers and state's financial viability.
- *Responsibilization*. On the one hand, an individual has the right to be in charge of own health and make health-related solutions. On the other hand, the lack of awareness about available treatment solutions and underdeveloped skills might lead to higher public costs.
- *Individualization*. By increasing the requirements for security standards and costs, individualization promotes the improvement of the diagnostic methods when more conditions can be treated as illnesses. This might hinder personal health improvements, e.g. the genome studies might identify lower risk groups, and, being aware

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[617] Rose, N. (2013). Personalized Medicine: Promises, Problems and Perils of a New Paradigm for Healthcare. *Procedia - Social and Behavioral Sciences*, 77: 341 – 352.

of that, people from these groups might refuse to participate in the universal healthcare.

Health education and support systems. The paradigm of personalised healthcare is aimed to encourage the patient to take care of own health and take greater responsibility for managing own health decisions and in preserving good health. Here the concern is given to the health awareness, identification of needs and participation in the medical decision-making[618]. This served as the basis for the introduction of a new management concept: self-management or co-management.

Health promotion systems are developed by establishing various models, which, first of all, are based on the patients' needs, and the patient is put at the centre of each model. For instance, Potem *et al.* (2010) suggested a healthy ageing model, which is anchored in established theory on health behaviour change. The model is characterised by four elements: 1) patient-centred perspective; 2) a goal-driven approach; 3) an individualised coaching strategy and 4) recognition of the importance of the broader health context in which clients live[619].

Health literacy. Health literacy focuses on an individual's ability to seek, understand and use health information. Numerous studies revealed that persons with limited health literacy often experience difficulty in negotiating, consulting and searching for better health services[620]. It goes without saying that health literacy is impacted by a wide range of socio-cultural factors; it also depends on a previously developed ability to learn and accumulate the new knowledge[621].

Each new health information flow passes through several stages. In the scientific literature, it covers the full span of a patient's journey from identi-

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[618] Ekdahl, A.W. Andersson L., Friedrichsen M. (2010). They do what they think is the best for me. Frail elderly patients' preferences for participation in their care during hospitalization, *Patient Educ. Couns.*, 80 (2): 233–240.

[619] Potempa K.M., Butterworth S.W., Flaherty-Robb, M.K., Gaynor W.L. (2010). The Healthy Ageing Model: Health behaviour change for older adults. *Collegian*, 17: 51–55.

[620] Mancuso, J.M. (2008). Health literacy: a concept/dimensional analysis. *Nurs Health Sci*, 10(3): 248-255.

[621] Zarcadoolas, C., Pleasant, A., Greer, D.S. (2005). Understanding health literacy: an expanded model. *Health Promot Int.*;20: 195–203.

fication to resolution of health problem, and this conceptual model consists of four stages[622]:

- Identification of health disorder;
- Accessing and navigating healthcare system;
- Visit and consultation (communication) with health professional;
- Factors and circumstances are determining the resolution of health problems.

One of the major problems related to health literacy is the specification of hypothesised dimensions of the concept and measurement techniques. In order to develop effective health literacy measurement tools, it is necessary to identify the factors having significant impact on literacy changes. Patient-related factors determining health literacy include[623]:

- Knowing when to seek health information;
- Knowing where to seek health information;
- Verbal communication skills;
- Assertiveness and pursuit of aims;
- Overall literacy rate;
- Capacity to retain health information;
- Information application skills.

These factors could be categorised as the internal factors. Relationship between patients and healthcare professionals also has a significant impact on health literacy, and this relationship is determined by:

- Patient's condition (emotional and physical condition, anxiety and fear, and trust in the healthcare system);
- Personal qualities of a health professional (terminology and methods of information provision);
- The nature of cooperation between health professionals and patients (forms of information exchange, information awareness assessment, recognition).

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[622] Jordan, J.E., Buchbinder, R., Osborne, R.H. (2010). Conceptualizing health literacy from the patient perspective. *Patient Education and Counseling* 79(1): 36–42.

[623] Jordan, J.E., Buchbinder, R., Briggs, A.M., Elsworth, G.R., Busija, L., Batterham, R., Richard, H., Osborne, R.H. (2013). Health Literacy Management Scale (HeLMS): A measure of an individual's capacity to seek, understand and use health information within the healthcare setting. *Patient Education and Counseling,* 91(2): 228–235.

Behaviour changes and empowerment. In order to create adequate conditions for behaviour change of the society toward the behaviour promoting a healthy lifestyle and increasing life expectancy, it is necessary to develop specific intervention tools. One of the major restrictions on developing new habits is time. It is the time when people start realising the necessity to change, and the time when a new intervention takes place. In other words, this is the time when a health professional creates, together with a person involved, an intervention which should determine behaviour change. In order to initiate behaviour change, it is necessary to ensure the relationship between an individual decision and the perceived benefit once the change has been implemented[624]. If the benefit is perceived, a difficult path of change becomes manageable[625]. In order to take up a healthy lifestyle, it is necessary to evaluate whether a person has competing needs requiring the same energy resources as health change. In view of this, one of the most effective intervention methods is patient/citizen engagement in change planning and empowering the patients to change their behaviour[626].

Self-management. Self-management involves learning to manage/control own disease or health condition[627]. Usually, it includes the activities like medication use, physical activity, healthy eatingg habits, etc. Besides direct self-control pursued according to the instructions of a healthcare professional, active health self-management determining life quality is significant for the patient's health condition. Quite often patients suffer from several diseases. Thus, self-management significantly improves their general health condition. Usually, chronic conditions are the leading cause of other diseases, e.g. depression; its incidence can be substantially reduced

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[624] Green, L. W., Glanz, K., Hochbaum, G. K., Kreuter, M. W., Lewis, F. M., Lorig, K., et al. (1994). Can we build on, or must we replace, the theories and models in health education? *Health Education Research*, *9*(3): 397–404.

[625] De Smet, B. D., Erickson, S. R., & Kirking, D. M. (2006). Self-reported adherence in patients with asthma. *The Annals of Pharmacotherapy*, *40*(3): 414–420.

[626] Franks, H., Hardiker, N.R., McGrath M., McQuarrie C. (2012). Public health interventions and behavior change: Reviewing the grey literature. Public health 126, p. 12-17.

[627] Schreurs, K.M.G, Colland, V.T., Kuijer, R.G., De Ridder, D.T.D., van Elderen, T. (2003). Development, content, and process evaluation of a short self-management intervention in patients with chronic diseases requiring self-care behaviours. *Patient Educ. Couns.*, 51: 133–41.

by empowering patients for self-management[628]. Since treatment of most of the chronic diseases is a long process, self-management educates a patient on how to care for himself/herself at a behavioural and cognitive level, helps patients make good decisions and accept the inevitable losses, and increases the probability of successful recovery[629].

IT in health management

The use of information and communication technology in health management has become a daily routine, and today the IT is a driving force imposing new practical management challenges and determining research trends.

The main IT achievement in the field of healthcare was that multiple information sources on health, health education and prevention have become accessible; their analysis made a huge breakthrough in the dynamic health studies and served as the basis for better understanding of health management. The IT provided the possibility to analyse multiple information databases. At the same time, vast amounts of data posed new challenges to IT systems, e.g. data management, data sharing and storage. IT development and special applications are facilitated the development of person-centred health policy and **personalised** health solutions. Demographic data, the data on wellbeing and social conditions complemented the healthcare system by providing new meanings to the formerly perceived knowledge.

Today the following trends of IT application in healthcare can be specified:

1. E-health: products and services provided by the internet. The most widely used definition of e-health is the use of IT in developing health services, products and processes combined with organisational change in healthcare systems and new skills in order to improve health of citizens, efficiency, and productivity in healthcare delivery, and the economic and social value of health[630].

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[628] Cramm, J.M, Nieboer, A.P. (2012). Self-management abilities, physical health and depressive symptoms among patients with cardiovascular diseases, chronic obstructive pulmonary disease, and diabetes. *Patient Education and Counseling* 87: 411–415.

[629] Barlow, J., Wright, C., Sheasby, J., Turner, A., Hainsworth, J. (2002). Self-management approaches for people with chronic conditions: a review. *Patient Educ. Couns.*, 48:177–187.

[630] Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, COM(2012) 736 fi-

2. Access to health resource management[631], including mobile applications promoting behaviour change. Quite often it is referred to as Person-Oriented Virtual Organisation (POVO) aiming at integrating all the resources related to each citizen's data. Such an infrastructure covers the wide range and heterogeneity of available resources (information sources, monitoring devices, simulation, modelling and forecasting tools), and grants each person the access to them.

Interconnection of healthcare innovations. The overview of the latest healthcare trends revealed an integral combination of conceptual provisions. The suggested health innovations are in line with the main mission of healthcare: to improve the quality of life through healthy lifestyle education and health support. A managerial approach toward healthcare paradigms reveals several levels of paradigms: conceptual, strategic, instrumental and outcomes paradigms. Such an analysis of paradigms facilitates understanding of an integral role of the e-health which serves as the basis for defining the future development trends and stakeholder cooperation platforms.

The interface of healthcare trends and the place of the e-health in healthcare strategies is presented in **Figure 7.1.** The person-centred healthcare covers all conceptual healthcare values and development trends, which are implemented through an integrated healthcare, empowerment and teamwork. These strategic provisions are supported by constantly developing personal health technologies, lifelong learning and health education. The strategic provisions are implemented via different instruments the most important of which are the IT solutions and personalised treatment solutions based on health promotion technologies. The personalised treatment solutions become meaningful and effective only when individuals are empowered and engaged in health self-management. Development of this system leads to the increased health literacy and changes in citizens' daily behaviour directed toward the better quality of life.

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nal: e-health Action Plan 2012–2020-Innovative health-care for the 21st century {SWD(2012) 413 final} {SWD(2012) 414 final} Brussels European Commission; 2012.

[631] Calvillo, J., Roman, I., Roa, L.M. (2013). Empowering citizens with access control mechanisms to their personal health resources. *International journal of medical informatics*, 82(1): 58–72.

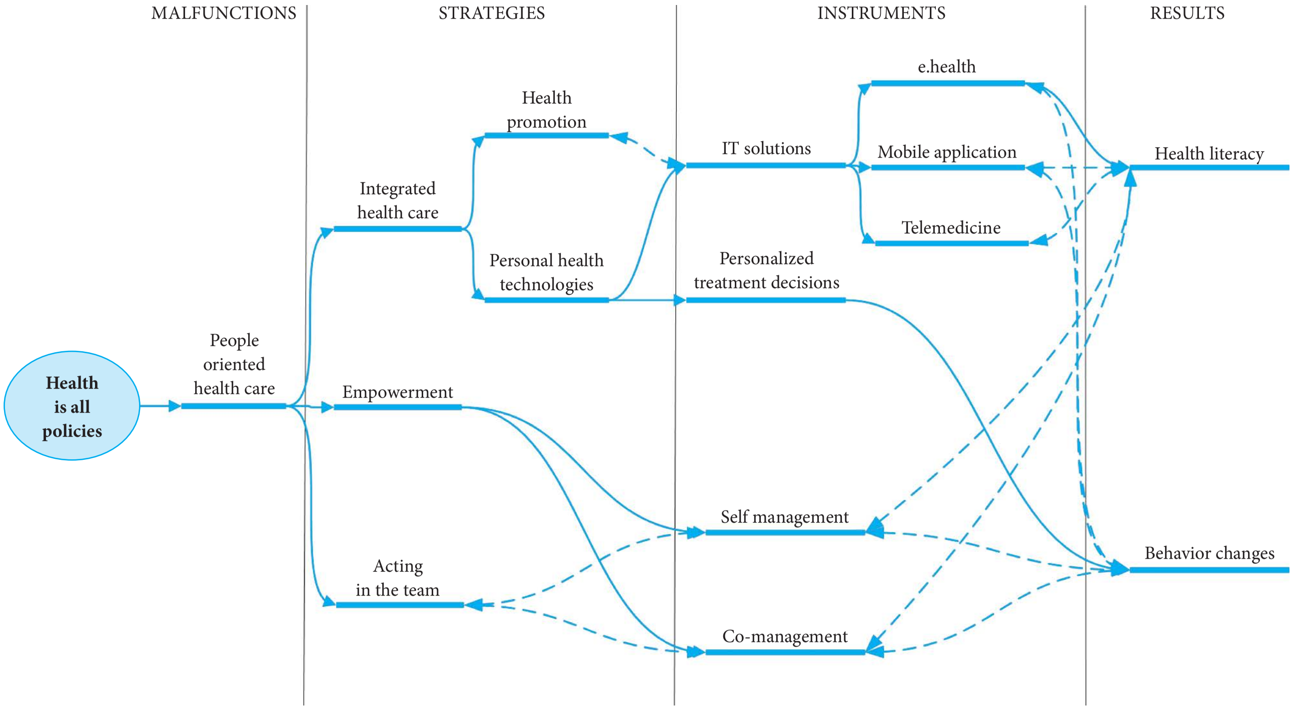

Figure 7.1. The interface of healthcare trends and the place of the e-health in healthcare strategies

As indicated above, the e-health is an imperative tool of the entire paradigmatic framework. Integrity of the e-health framework as an instrument is outlined by the coherence of the already considered paradigms (e.g. integrated and personalised healthcare, empowerment, and support for behaviour change and health education); their integration in the operational tasks determines the precise definition of the goals pursued by the e-health development. The e-health operational tasks could be specified via the following structural elements:

- to support health enhancement via integrated health services,
- to provide an individual with adequate information on his/her health, possible health condition changes and principles for behaviour change,
- to act as an intermediary in providing assistance and counselling,
- to help people understand the state-of-the-art technologies,
- to ensure adequate patient engagement and their responsibility in establishing self-health management principles,
- to increase health literacy by personalising the needs and treatment strategies.

In developing the stakeholder engagement and communication platforms, it is very important to fulfil the above structural e-health tasks in the platforms. This is necessary in order to retain the same healthcare concept principles, put the stakeholders at the centre of e-health developments and facilitate their contribution to the development of a common framework.

The next chapter will provide an overview of management paradigms in developing the model of the stakeholder cooperation platform.

7.2. The interface of theoretical management paradigms in developing and implementing the model of the stakeholder cooperation platform

The interface of management theories intended to specify the e-health system development trends.

The deployment of the e-health concept should be based on management theories, which could facilitate the achievement of functional e-health objectives and the compliance of the cooperation platform with these theories.

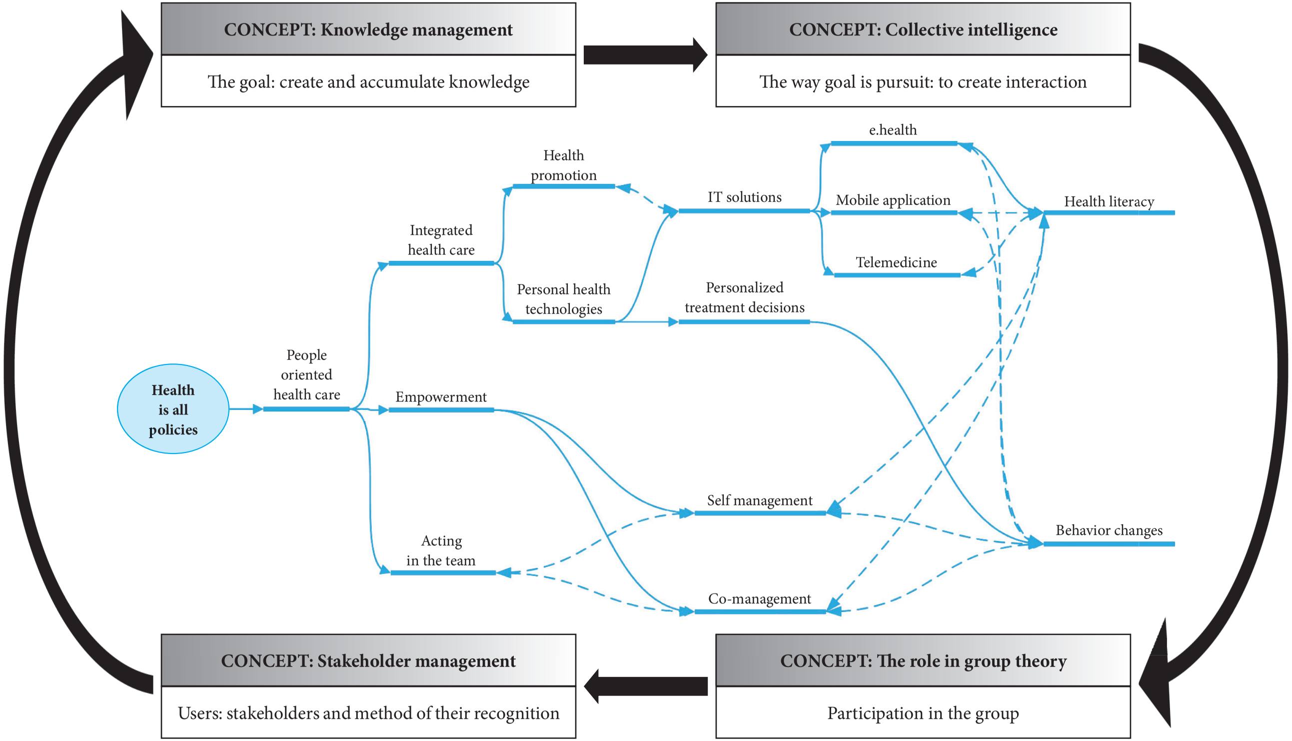

Figure 7.2. The interface of theoretical management paradigms in developing and implementing the model of the stakeholder cooperation platform

In view of this four management theories have been selected: 1) knowledge management process, 2) stakeholder management, 3) team role theory in the cooperation cycle and 4) collective intelligence. The interface between the management theories and health innovations is presented in **Figure 7.2**. Below a more detailed analysis of each management theory is provided.

7.2.1. Knowledge management

One of the aims of the e-health platform for stakeholder cooperation is to accumulate and share the knowledge related to the functioning and improvement of the e-health system. Besides its main and direct aim the cooperation platform can help realise other health innovation-driven aims, e.g. change the behaviour of e-health users determined by newly acquired or newly perceived knowledge. It goes without saying that knowledge becomes the object of investigation. Therefore it requires a good understanding of knowledge development and management principles.

The knowledge-based system is a consistent logical structure of thinking, cognition and practice prevailing among the members of one specific community[632]. This knowledge might be an equivalent of the external world (thinking models) or of certain beliefs about the external world. The latest research is aimed to follow consistently the development of different knowledge systems and their changes determined by a social context. The practitioners are also interested in the use of knowledge within the institution so as to make knowledge an internal source. The demand for and the use of knowledge at an individual, organisational or state level is perceived as a necessary pre-condition for the development of a new quality of life and for the pursuance of strategic aims of an organisation not only in the area of innovative activities, but also in daily life.

Types of knowledge. Several types of knowledge have been highlighted during multiple discussions on knowledge management. One of the typologies divides knowledge into two main categories: “local knowledge” and scientific knowledge. Individual experience (not an expert or another in-

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[632] Richards, P. (1985). *Indigenous Agricultural Revolution: Ecology and Food Crops in West Africa*. Methuen, MA, USA.

formation) is classified as a local knowledge[633]. There are also the traditions relating the personal and cultural experience. Whereas the scientific knowledge is more related to the systematically collected information, therefore this knowledge is subject to other evaluation requirements for it is usually validated and generated by applying standardised principles and collection processes[634]. It is often necessary to bear in mind that stakeholders' local and scientific knowledge levels are different. Of course, the major variations are observed at the level of local knowledge and the need for scientific knowledge. Pursuant to the recent research, the major differences are in the views of scientists and non-governmental organisations. Quite often scientists consider financial resources as very important. Their attitude toward a wider context is structured. Whereas managers are usually focused on the process and seek final judgement[635]. Unfortunately, this division is insufficient since it does not reveal other, knowledge-related aspects, e.g. stakeholders' contribution. The above typology doesn't reveal the emergence of stakeholders, as well as their structural and knowledge developments/changes determined by a wider social context, and how the available knowledge expands beyond their interests.

Another important typology of knowledge is a division of knowledge into explicit and tacit. The tacit knowledge is the knowledge that people carry in their minds; it is hardly shared or not shared at all. Initially, all the knowledge appears as tacit and only, in the long run, through long knowledge management road, tests, and errors this knowledge is perceived, understood and recorded. The explicit knowledge exists in the form of words, sentences, documents and organised data. In the above typology, knowledge management is the process of transforming tacit knowledge into explicit knowledge.

E-health knowledge management cycle. Knowledge formation is a continuous process. One of such processes is the participation of stake-

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[633] Fazey, I., Fazey, J., Fischer, J., Sherren, K., Warren, J.M., Noss, R., Dovers, S. (2008). Adaptive capacity and learning to learn as leverage for social-ecological resilience. *Front. Eco. Environ.*, 5: 375–380.

[634] Turnbull, D. (1997). Reframing science and other local knowledge traditions. Futures 29: 551–562.

[635] Graya, S., Chanb, A., Clarkb, D., Jordanb, R. (2012). Modeling the integration of stakeholder knowledge in social–ecological decision-making: Benefits and limitations to knowledge diversity. *Ecological Modelling,* 229: 88– 96.

holders in the decision-making processes. And although it was proved that stakeholder engagement leads to high quality and durable decisions and provides the framework for implementation of the decision, the knowledge management process is not clear and causes many problems[636]. A classical knowledge management process covers the following stages: acquisition, creation, refinement, storage, transfer, sharing and utilisation[637].

Each knowledge management cycle (from explicit to tacit knowledge) undergoes some knowledge storage, accumulation and verbalization stages. These stages become rather complicated in terms of inclusion and engagement of stakeholders. Based on the knowledge management paradigm[638], it is possible to develop an e-health idea management cycle (**Figure 7.3.).** The cycle includes all knowledge creation and utilisation stages with maximum stakeholder participation.

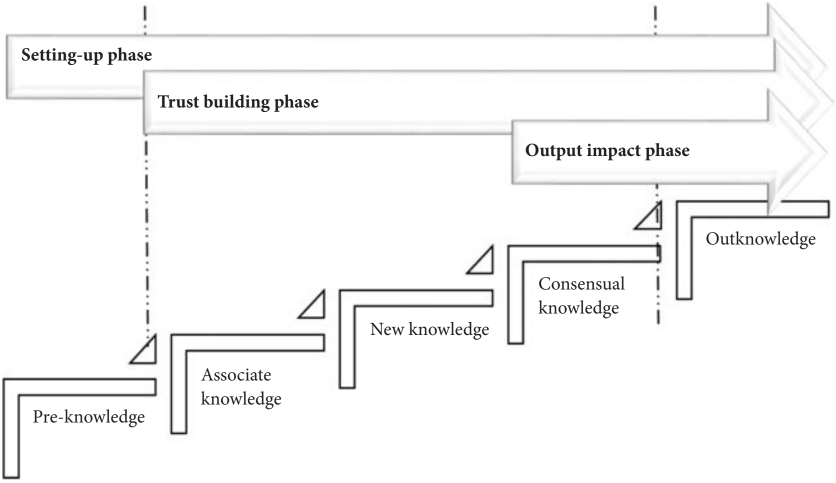

Figure 7.3. Knowledge management cycle of each new idea

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[636] Reed, M.S. (2008). Stakeholder participation for environmental management: a literature review. *Biol. Conserv*. 141: 2417–2431.

[637] King, W.R. (ed.) (2009). *Knowledge Management and Organisational Learning*. Annals of Information Systems 4, DOI 10.1007/978-1-4419-0011-1_1, © Springer Science+Business Media, LLC.

[638] Nonaka, I. and Nishiguchi, T. (2001) *Knowledge emergence: Social, Technical, and Evolutionary Dimensions of Knowledge Creation*. New York: Oxford University Press, p. 320.

- *Pre-knowledge*

The stakeholders bring the previous information, problem understanding, thinking patterns, as well as their priorities and needs to the decision management platform.

- *Associate knowledge*

Working together with the peers, the stakeholders highlight in the general framework and associate the available individual knowledge about the current state into one totality by emphasising the analysis of relevant alternatives.

- *New knowledge*

Participants try to find totally new solutions together; they generate the requested alternatives, analyse their suitability and possible impact and verify their comprehensiveness.

- *Consensual knowledge*

Consensus-building facilitates coordination of mutual aspirations of policy players and provides the basis for mutual understanding. Consensus is related to both, the understanding of the problem and problem-solution methods.

- *Out-knowledge*

The knowledge obtained from the mutual actions becomes a source of a continuous learning process. Stakeholders' learning process determines future actions and success of the selected alternative through its implementation and preparation to solve other problems. During this knowledge-building cycle, functional engagement is very important. In other words, though all stakeholders are engaged in all the phases, their role, functions, and responsibilities are different. Functions and dynamics are interrelated: some participants take the initiative, the others are in charge of implementation. But during the next phase they might switch the roles. Below there is an overview of the team role theory.

7.2.2. Collective intelligence

Through knowledge gathering the e-health platform for stakeholder, cooperation provides the possibility to achieve the synergy effect – collective intelligence – by combining the knowledge of individual users (usually they become stakeholders). Collective knowledge-building is possible only under certain interoperability conditions analysed in the collective intelligence management theory.

Collective intelligence (CI) or group/shared intelligence emerges from the collaboration and competition of many individuals.

When speaking about the CI, we use the verbs like "develops" and "emerges" in order to highlight the dynamic nature of CI[639]. The emergence of the collective intelligence is associated with the idea that on certain conditions team decisions might be far more effective and creative than an individual person's decisions. The CI-related and far advanced research has led to the development of methodologies aimed not only to assess how well a single group can perform different tasks but also to predict how that same group will perform other tasks in the future within the framework of the defined tasks[640]. The above research has met with particular interest of the community after the publication of the research of CI specialists in the *Science* magazine in 2010.

Another concept in this context is *crowdsourcing*. Such intelligence emerges by soliciting contributions from the online community when web-based collective intelligence is used in pursuance of specific goals. Crowdsourced intelligence helps to strengthen relations between the organisations and communities in the search for common solutions.

The research revealed that some problems could be better solved by employing CI. Brabham identified the following types of problems: *Knowledge Discovery and Management approach*, *Distributed Human Intelligence Tasking approach*, *Broadcast Search approach* and the *Peer-Vetted Creative Production approach*[641]. The types of the above tasks are also manifested in the stakeholders' interaction in solving multi-functional problems like e-health development.

Regarding the knowledge search and management, the reference is made to the information management tasks such as information collection,

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[639] Levy, P. (1997). *Collective Intelligence: Mankind's Emerging World in Cyberspace.* New York and London: Plenum Press, p. 277.

[640] Woolley, A.W., Chabris, C.F., Pentland, A., Hashmi, N., & Malone, T.W. (2010). Evidence for a collective intelligence factor in the performance of human groups. *Science*, 330: 686–688.

[641] Brabham, D.C. (2012). Crowdsourcing: A model for leveraging online communities. In: Delwiche, A., Henderson, JJ, eds. The participatory cultures handbook. New York: Routledge, p. 120–129.

sorting and preparation of reports in creating collective data sources. Usually the required information is available but it is outside the organisation and is often fragmented; therefore team efforts are necessary for gathering, grouping and processing the information.

Distributed Human Intelligence Tasking approach covers the situations when it is necessary to process and analyse vast amounts of data. This approach is most useful when human intelligence is more effective than computer analysis or when computer analysis is automatically impossible because of the absence of relevant algorithms.

Broadcast Search approach is also referred to as innovation contests[642], when very specific information is required to generate the best solution, when information on a phenomenon is not accessible, and when sometimes only one community member has this information.

Peer-Vetted Creative Production approach could be applied when the solution is a matter of users' choice rather than determination to find a rational solution. These could also be the factors determined by market changes, e.g. selection of political strategies or the e-health design, etc. Thus, it is necessary to awaken our creativity and link it to the available information which is often outside the organisation and is managed by other stakeholders.

Brabham also suggested the decision tree for determining a suitable crowdsourcing type based on the problem source[643]. The case of public health has been taken as an example.

No matter how difficult is the management of the emerging collective intelligence, the conditions for maintaining and supporting this process are clearly defined. Although the majority of them are easily realised via ordinary management tools, the pursued outcome is determined by their coherence. Below there is the analysis of a set of relevant factors supporting the emergence of the collective intelligence described in detail by MIT scientists[644].

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[642] Terwiesch, C., Xu, Y. (2008). Innovation contests, open innovation, and multiagent problem solving. *Manage Sci.,* 54(9):1529–43.

[643] Brabham D.C. 2014. Crowdsourcing Applications for Public Health. Am J Prev Med, 46(2), p. 179-187.

[644] "Handbook of Collective Intelligence", 2012, [accessed 10-06-2014]. <http://scripts.mit.edu/~cci/HCI/index. php?title=Main_page&oldid=3770#Perspectives_on_collective_intelligence>.

1. *Diversity*

Diversity is considered as one of the main factors affecting the emergence of collective intelligence. It is the result of various individual opinions and suggestions determining "superadditivity" of ideas when a sum of seemingly simple five approaches gives 10 pairs of new ideas[645]. Prediction diversity is the variance of predictions; it shows the difference between the collective (crowd) error and an individual's error. If the difference is equal to zero, it means that individual predictions are the same and that the average of individual errors equals to the crowd's errors. Thus in order to ensure the emergence of the collective intelligence and increase the accuracy of the crowd predictors (e.g. the external truth), it is necessary to ensure optimal diversity of attitudes. It goes without saying that diversity could also be an obstacle preventing from knowing the truth; therefore, in order to avoid obstacles, all the participants shall pursue their own goals. If the crowd is well aware of and shares its aims and values, it retains the identity and integrity and guarantees diversity of attitudes.

2. *Formal/informal organisational structure*

The organisational theory reveals how organisational structures determine effectiveness and performance. For instance, informal organisations are better at supporting innovations than hierarchical organisations; whereas hierarchical organisational structures lead to faster solutions in pursuing determined and clearly defined activities. Meanwhile, the collective intelligence requires informal, most often cross-linked structures where participants can act freely and independently since the organisational structure has a direct impact on the interconnection of the participants and on the nature of the connection.

3. *Modularization of tasks*

The organisational theory demonstrates that grouped tasks reduce interdependence between the participants and, consequently, improve performance of the entire team. Thus, tasks grouped into the modules facilitate the decision-making inside the module without the control of the external manager and, thus fosters greater responsibility.

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[645] Scott, E.P. (2007). The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies. Princeton University Press. p. 424.

4. Dense communication structure

Dense communication structure improves the productivity of any group. Density might be understood as a dense network where most of the theoretical links exist in practice; this is a guarantee that network is free of structural holes where the unshared information disappears.

5. Engagement incentives

Among multiple incentives to participate in the derivatives of collective intelligence, economic incentives are highlighted in the first place. They cover cash awards or financial benefits, career opportunities or re-distribution of tasks. Social recognition measures could also be referred to as incentives. They can be used both as an individual and group motivation measures during the team building and trust building process. The third group of incentives is highlighted as self-realisation incentives[646].

6. Shared vocabulary and other infrastructure

Shared vocabulary is developed via the associated knowledge management cycle when participants are given enough time to exchange the background information and share each other's vocabulary. A shared infrastructure facilitates daily collaboration when the procedures and rules do not change, are well perceived and piloted.

7. Tags

Tags are becoming the key words of collective intelligence (CI) describing the shared vocabulary used by the CI community. It means the assignment of tags and categories to issues under discussion or to the information, and they become a new content of CI for both the community members and items. Tags could be categorised into three types: professional, community generated and programme generated[647]. Thus, tagging enables the users to develop the shared vocabularies and represents various kinds of metadata: content-based metadata, collaboration or interaction metadata. This makes the information easier to remember and disclose general community interests. In summary, the tag-based shared vocabulary reflects characteristic phrases; user perception and user identification; semantic meaning/value

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[646] Lykourentzou, I., Papadaki, K., Vergados, D.J., Polemi, D., Loumos V. (2010). CorpWiki: A self-regulating wiki to promote corporate collective intelligence through expert peer matching. *Information Sciences* 180 (1): 18-38.

[647] Alag, S. (2009). *Collective Intelligence in Action.* Mannin, Greenwich, p. 424. ISBN: 1933988312, e-book.

of the content even when the word is not mentioned in the text; ambiguous concepts; information on collaboration and users; wide range of most common concepts.

8. Awareness

Awareness and collaboration are the two interrelated concepts. In order to build effective collaboration, it is important to learn about the peers (what information is made available to them; what were the intentions of participant mergers, what is their experience in using various instruments, and what criteria they prefer for the evaluation of joint performance, efforts, and outcomes). If this is an instant collaboration, the additional information is obtained from visual elements (facial expressions, gestures, etc.). Thus common understanding and approach building is much faster. If this is a short/long distance collaboration, some pieces of information get lost, and lack of information should be compensated by the additional efforts. The analysis of the awareness mechanisms highlighted several attitudes: 1. Informative (awareness raising by integrating notification systems, e.g. information on email about a new message/new community member, etc.); 2. Role-play restrictions (information manager, information editor). Depending on the roles of the system users, the access to information, is restricted or less restricted.

9. The power of edges

Usually, traditional organisations deploy a hierarchical management structure and trust it as the most effective management system. If with respect to work coordination this is an effective system, regarding the information flow management this system restricts information flows from the lowest to highest hierarchical levels. When an organisation is not supporting bottom-up initiatives, there is strong likelihood that top managers may not recognise relevant change trends.

10. The power of an ecosystem

A one-way and unified approach often reduces situation awareness, and this increases the likelihood of omission of an unknown and unrecognised element. Whereas several approaches introduced by the stakeholders can help scan the unknown and unrecognised environment. Usually, a conversation or discussion facilitate the analysis of the external environment.

7.2.3. Stakeholder management

Stakeholder management identifies the users of the e-health platform for stakeholder cooperation and answers the questions on who are the e-health stakeholders, how to identify them and ensure their engagement.

In his stakeholder theory, Freeman[648] suggested a new trend of research in management by defining a stakeholder as an individual who is affected by or can affect the achievement of an organisation's objectives. This concept has become essential in negotiating organisational links and stakeholders in the networks[649].

Freeman provided a comprehensive analysis of stakeholders' role in developing the organisational structure. The importance of stakeholders was further discussed in different organisational contexts[650]. It was recognised that stakeholders are very important for the existence of an organisation[651]. The above approach raised the awareness and engaged in the organisation's management not only the internal but also the external stakeholders interested in the organisation's performance.

The stakeholder theory as an organisational strategy is based on the loyalty, which might be based on the economic criteria[652]. For quite a long time, the stakeholders were perceived as suppliers, product/service users or staff members of an organisation. Further development of the stakeholder theory has given rise to new stakeholders. A stronger focus on governance issues has led to the recognition of managers as influential stakeholders. Although an organisation's management structure should guarantee effective problem management, yet it incites additional conflicts of interests; for instance, the interests of the investment manager may differ from those of

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[648] Freeman, R.E. (1984). *Strategic management: A stakeholder approach*. Boston: Pitman.

[649] Neville, B.A., Bell, S.J., & Menguc, B. (2005). Corporate reputation, stakeholders and the social performance-financial performance relationship. *European Journal of Marketing*, 39(9e10): 1184-1198.

[650] Friedman, A. L., & Miles, S. (2002). Developing stakeholder theory. *Journal of Management Studies*, 39(1): 1-21.

[651] Sheehan, L., Ritchie, J.R.B., & Hudson, S. (2007). The destination promotion triad: understanding asymmetric stakeholder interdependencies among the city, hotels and DMO. *Journal of Travel Research*, 46(1): 64-74.

[652] Tullberg, J. (2013). Stakeholder theory: Some revisionist suggestions. *The Journal of Socio-Economics* 42: 127–135.

the head/owner of an organisation. Thus, one management unit determines the emergence of three additional stakeholder groups.

Two-way and network-like dependencies. The stakeholder theory and its initiators recognised the two-way dependencies between each stakeholder and a specific organisation presupposing that two-way relationships are not interdependent. Based on this two-way relationship stakeholders were categorised on the basis of three stakeholder attributes: power, legitimacy, and urgency[653]. This approach didn't explain how organisations respond to each individual stakeholder; in fact the response is directed toward multiple stakeholders' needs; thus, a stakeholder network perspective [654] reveals the principles and nature of the activity with stakeholders more precisely. The social networks theory suggested a set of criteria which could serve as the basis for further investigation of stakeholder engagement (e.g. network density, mediation, average distance etc.) and the extent of impact on an organisation (e.g. centricity). This approach allowed to identify not only the predetermined characteristics of stakeholders but also to place greater emphasis on the behaviour determined by the social environment. New relationships in the stakeholder network help both, to explain the decisions taken and predict the decisions. The social network research revealed many unexpected yet major trends on actual operations of stakeholder networks, for instance, an organisation can better withstand pressure from stakeholders if it is central in the network, and when interdependence of other stakeholders is less tight. There are four types of stakeholders: commander, compromiser, subordinate and solitarian.

Dynamic stakeholder theory. A new trend in the stakeholder theory was accompanied by the development of a network theory where greater emphasis was placed not only on the static networks but also on the dynamic changes within the network and formation of new trends in the network[655]. Thus, regarding stakeholder engagement, in the dynamic perspec-

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[653] Mitchell, R.K., Agle, B.R., Wood, D.J., 1997. Toward a theory of stakeholder identification and salience: defining the principle of who and what really counts. *Acad. Manag. Rev*. 22(4): 853 – 886.

[654] Rowley, T.J., (1997). Moving beyond dyadic ties: a network theory of stakeholder influences. *Acad. Manag. Rev*. 22: 887 – 910.

[655] Missonier, S., Loufrani-Fedida S. (2014). Stakeholder analysis and engagement in projects: From stakeholder relational perspective to stakeholder relational ontology. *International Journal of Project Management,* 32: 1108 –1122.

tive each member of the network can change the place, switch the roles and initiate new restrictions both inside and outside the stakeholder network. Such interactions change the state of interest-coordination as well as the resources allocated to a joint activity. The dynamic stakeholder research proved that interests expressed during one activity (e.g. project implementation) might change and go beyond the initial intentions[656].

The research revealed the emerging differences between the attitudes toward the use of the stakeholder theory in different regions. For instance, in North America two models are observed[657]: stakeholder value enhancement model (each organisation seeks to reinforce organisational value, e.g. financial value) and stakeholder model. The first model is based on liberal and individualist attitudes stating that any organisation consists of a group of individuals motivated by the pursuit of their own interests and decisions. The stakeholder model recognises that an organisation seeks to obtain benefits and at the same time acknowledges that an organisation can attempt to respond to stakeholder (staff or community) interests. This model presents the three aspects of stakeholder theory: descriptive, instrumental and normative[658].

Whereas in Europe stakeholders are usually perceived as an integral part of a wider corporate governance; in fact, there are many stakeholder engagement options, but there are a few basic trends. Scandinavian companies pursue collaborative network-building with employees, trade unions, and financial institutions and engage stakeholders in the ultimate decision-making bodies. A similar practice is pursued in Germany. This practice was first of all determined by the corporatism values when social and economic perspectives were integrated into decision-making[659].

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[656] Missonier, S., Loufrani-Fedida S. (2014). Stakeholder analysis and engagement in projects: From stakeholder relational perspective to stakeholder relational ontology. *International Journal of Project Management,* 32: 1108 –1122.

[657] Jurgens, M., Berthon, P., Papania, L., Shabbir, H.A. (2010). Stakeholder theory and practice in Europe and North America: The key to success lies in a marketing approach. *Industrial Marketing Management,* 39: 769-775.

[658] Donaldson, T., & Preston, L.(1995). The stakeholder theory of the corporation: concepts, evidence and implications. *The Academy of Management Review*, 20: 65–91.

[659] Jurgens, M. Berthon, P., Papania, L., Shabbir, H.A. (2010). Stakeholder theory and practice in Europe and North America: The key to success lies in a marketing approach. *Industrial Marketing Management,* 39: 769-775.

Stakeholder engagement process. Although engagement and motivation of stakeholders is a complex and not always a successful process, so far the literature doesn't provide a uniform or single solution. Usually, this is process is based on managerial solutions and contains multiple variations. For example, one of them well reflects practical stakeholder engagement since it is used in the practical and non-theorised tourism sector. The authors named this stakeholder engagement process the multi-stakeholder involvement management (MSIM) framework consisting of two elements. One of them consists of three strategic levels: attraction, integration and management of stakeholder involvement. The second structural element reflects process levels dividing the process into six stages: scene-setting, recognition of stakeholder engagement capacity, stakeholder relationship management, the pursuit of achievable objectives, influencing implementation capacity and monitoring stakeholder engagement[660].

7.2.4. Team role theory

The team role theory helps to understand better joint actions of stakeholders and obstacles hindering the teamwork.

Teamwork and its effectiveness depend on four factors: explicit and inclusive instruction, empowered team structure, support of the organisational structure, and specific expertise[661]. Regarding the e-health issues, it is not realistic to expect explicit instructions on the development of IT systems for this is a creative process pursued for the first time. But it is possible to build a team structure facilitating achievement of relevant results.

Team roles. The team role theory began to take shape from minor team surveys analysing the interaction between the team members, as well as their relationships, behaviour patterns, and task accomplishment. The fo-

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[660] Waligo, V.M., Clarke, J., Hawkins, R. (2013). Implementing sustainable tourism: A multi-stakeholder involvement management framework. *Tourism Management* 36: 342-353.

[661] Hackman, J.R., Wageman, R., Ruddy, T.M., Ray, C.R. (2000). Team effectiveness in theory and practice. In: Cooper C, Locke EA Industrial and organisational psychology: Theory and practice. Oxford, UK: Blackwell.

cus was given to the social-emotional behaviour of the participants[662, 663]. Later the research analysed successful work-teams and revealed that success and effectiveness of a team depend on the team's ability to spread the roles and on the nature and number of roles. Belbin[664, 665] is the architect of the above research. Initially, Belbin introduced an eight-role model; this version was later modified to embody the nine role model. He said that these roles emerged naturally and increase team's efficiency. The main roles are:

1. Coordinator (leader). Respected member of the team, a good manager, setting the roles, delegating and reassigning responsibilities and promoting decision-making.
2. Plant/Innovator. Creative, imaginative and able to solve difficult problems.
3. Resource Investigator. Enthusiastic, communicative; the main function is to explore opportunities and develop contacts.
4. Shaper. Dynamic, thrives on pressure, has the drive and encourages the others to overcome obstacles.
5. Monitor evaluator. This member sees and analyses all options and judges accurately; unemotional and capable of making rational decisions.
6. Team-worker. Cooperative, diplomatic, good listener, works to reduce tension on the team.
7. Implementer. Well-organised, reliable, sometimes conservative but efficient; turns ideas into actions.
8. Completer-finisher. Painstaking, curious, checks the details, searches out errors, polishes and perfects to ensure that everything is done in due time.
9. Specialist. Is focused on the own subject and is able to work independently.

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[662] Benne, K.D. and Sheats, P. (1948). Functional roles of group members, *Journal of Social Issues*, 4: 41-49.

[663] Bales, R.F. (1950). A set of categories for the analysis of small group interaction. *American Sociological Review*, 15: 257-263.

[664] Belbin, R.M. (1981) *Management Teams: Why They Succeed or Fail*, Butterworth-Heinemann, Oxford.

[665] Belbin, R.M. (1993) *Team Roles at Work*, Butterworth-Heinemann, Oxford.

Team role balance. Belbin's team role theory is evaluated in terms of the claim that high team performance is associated with teams which are balanced in terms of the team roles represented amongst team members[666].

Thus, team role balance becomes an important task for team compatibility. Belbin summarised the research by concluding that a team of six members is ideal for working with complex problems. Thus, if we admit 9 possible roles, several members of the team can take on more than one of the nine roles. Usually, each team member plays a certain role; there is one role which dominates, but the second role can also be significant. Since management focuses on the measurement of the team role balance, Parington and Harris formulated Team Balance Indices[667]; this provided empirical evidence of changes in the team's efficiency at different role set. For instance, it was established that strong coordinator often lowers the effectiveness of the team. This is related to the suppression of functions of other team members. Usually, suppression of the initiative and creativity leads to over-dependence on centralised decision-making. A team with no innovators often struggles to come up with the initial spark of an idea with which to push forward. However, once too many innovators in the team, ideas begin to compete and it is difficult to select the one to start the work with. This leads to time delays.

Team dynamics. Without any doubt, teamwork results are determined by the stages of team development. Take-over of specific functions and distribution of roles is time-consuming the process. The literature provides a five-level model of team development[668] associated with the team performance in the problem-solving and decision-making. Team development was measured according to their focus on task (1), process (2), team structure (3), team dynamics (4) and team trust (5). While this does not tell the direction of the causal relationship, it highlights the areas of possible failures. The research proved that better results were achieved by the level-five development teams (trust between their leaders and team members), and

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[666] Senior, B. (1997). Team roles and team performance: Is there 'really' a link? *Journal of Occupational and Organisational Psychology*, 70(3): 241-258.

[667] Partington, D. and Harris, H. (1999). Team balance and team performance: an empirical study. *The Journal of Management Development*, 18(8): 694-701.

[668] McFadzean, E. (2002). Developing and supporting creative problem-solving teams: Part 1 – a conceptual model. *Management Decision*, 40(5/6): 463-476.

the teams which have passed through the stage of dynamics (members are engaged and totally committed). This suggests that more developed teams which are already doing well could do better by having the appropriate Specialist knowledge[669].

Summary

Prerequisites for the e-health platform for stakeholder cooperation can be best explained via the hierarchy of health policy and management innovations, and interoperability of management theories where knowledge management specifies the aims of the developed platform (to accumulate/analyse knowledge); management of collective intelligence specifies the purpose of the e-health platform for stakeholder cooperation (to create the synergy between the stakeholders in pursuit of new quality of the collective knowledge); stakeholder management defines the users of the e-health platforms (who are e-health stakeholders and how to recognise them); the team role theory helps to understand better joint actions of stakeholders and obstacles preventing from teamwork.

7.3. Theoretical stakeholder engagement and participation model

The e-health platform for stakeholder cooperation has been developed as an integrated technological platform based on the **theoretical model promoting engagement and participation of stakeholders (hereinafter referred to as the stakeholder engagement model).**

The stakeholder engagement model is based on the four theoretical management paradigms discussed in par. 7.2:

- Knowledge management;
- Collective intelligence;
- Stakeholder theory;
- Team role management.

Aim. The aim of a broader e-health stakeholder engagement is to create a new quality knowledge and e-health content based on the specialised and diversified knowledge in developing new and effective e-health solu-

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[669] Chong, E. (2007). Role Balance and Team Development: A Study of Team Role Characteristics Underlying High and Low Performing Teams. *Journal of Behavioral & Applied Management*, 8(3): 202-217.

tions focused intently on meeting stakeholders' expectations. Building new quality knowledge is possible only after passing through all the stages of knowledge management and by creating the synergy and interoperability between different stakeholders. In view of this, the stakeholder engagement model is to describe relevant management terms and their interconnections determining stakeholder engagement and participation support in developing the best e-health system solutions.

Elements of stakeholder engagement model. Structurally the model consists of five elements: participants, role-based collaboration (RBC), collective intelligence management tools (MM), knowledge management process (KMP), and interaction (**Figure 7.4**). All elements of the stakeholder engagement model are interrelated. Yet, these are non-linear dependencies; the complex nature of phenomena leads to process changes and the latter determine changes in other elements.

Description of five elements.

1. *Participants.*

Participants can be all stakeholder groups, including organisations and individual actors. The associated interest groups are often better prepared for participation compared to other stakeholder groups; yet the model shall ensure equal terms for the engagement and participation of all stakeholders with no distinction of their abilities or preparation methods. Other elements of the model should focus on this aspect.

2. *Role-based collaboration.*

Participation becomes meaningful when the ones involved in the e-health development process perceive their engagement aims, possible roles, and functions. Effective distribution of team roles can help organise participants' contribution to knowledge accumulation/gathering, and set realistic and achievable expectations. Role playing is not a static process. For instance, in one specific e-health development stage one stakeholder might play the role of a coordinator whereas the other might assume the role of an implementer or specialist consultant. In the next stage stakeholders might switch the roles. Such a dynamics provides for an effective redistribution of responsibility.

3. *Engagement-promoting element: collective intelligence management tools (MM).*

These measures help to fulfil the roles effectively and assume more than one role during the e-health system development process. The inclusion

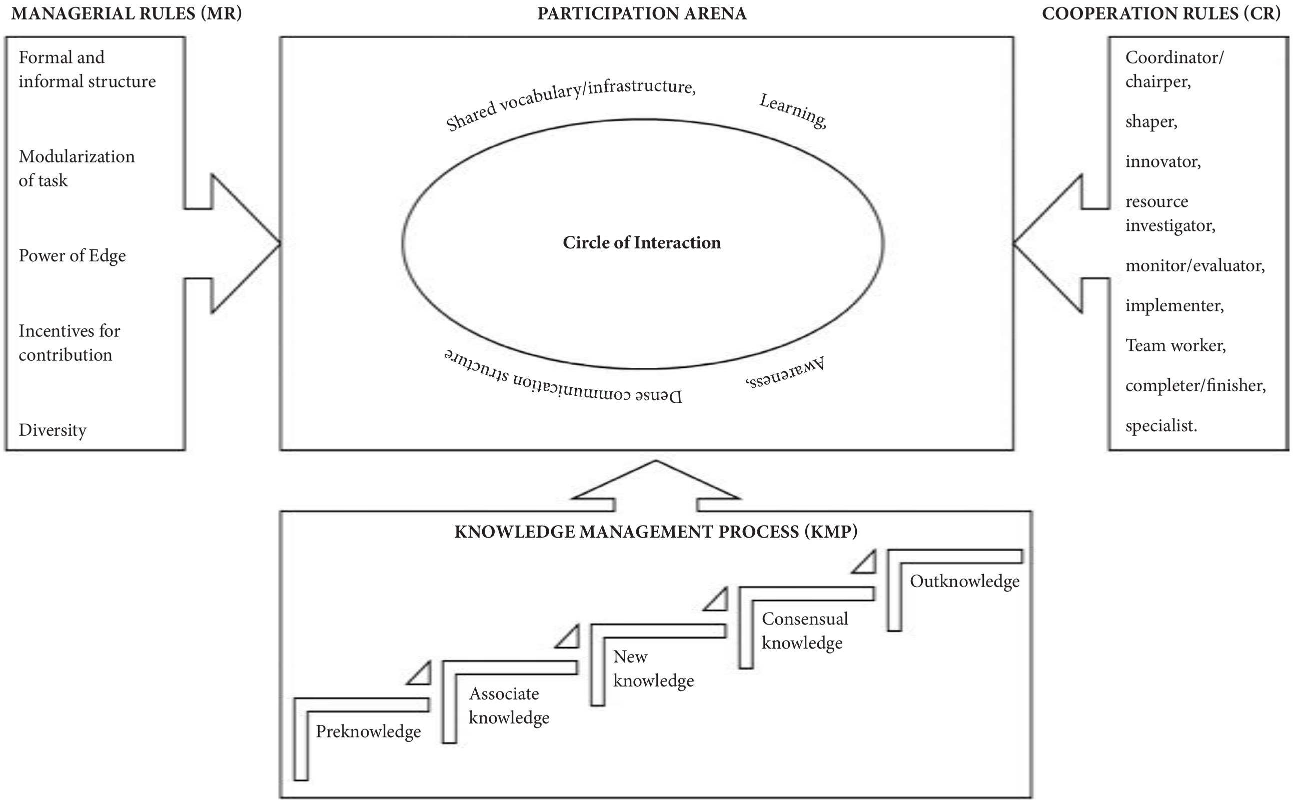

Figure 7.4. Theoretical stakeholder engagement and participation model

measures are aimed to determine the factors affecting stakeholders' motivation to engage intensively, contribute to the creation of new collective knowledge and retain motivation during the entire e-health development cycle. The inclusion measures are determined by the prerequisites and factors of the emerging collective intelligence.

4. *Knowledge management process.*

Any new idea introduced during the stakeholder cooperation process shall go through the successive knowledge management stages. If a system contains idea collections, it doesn't mean that all the ideas go through the knowledge management stages simultaneously.

5. *Interaction.*

The interaction occurs when a shared vocabulary takes on its final shape. It is the beginning of the associated knowledge-building determining continuous learning and understanding of the main ideas. This is an interim engagement/participation result aimed to attain the intended subject outcomes. When there is no interaction or when it is not continuous, the remaining elements do not create the desired synergy effect.

Out of the five elements three are subject to management tools allowing to anticipate possible consequences. In other words, management tools can help identify the stakeholders, introduce the most frequent team roles and create the necessary conditions to facilitate the emergence of collective intelligence. Another two elements (interaction and knowledge management process) become explicit functions of other three elements.

The stakeholder engagement model reveals a three-dimensional nature of participation. Effectiveness of the knowledge management process and interaction E(KMP+I) is a dynamic function depending on the **collective intelligence management tools (MM), the complete group of stakeholders, quality of the role-based collaboration (RC), and effective interactions:** $E(KMP + I) = f(MP, RC, I)$.

7.3.1. Stakeholder groups

The pursuit of the e-health efficiency has become the aim of many stakeholders in their respective sector, and they contribute to the achievement of this objective through collaborative interactions. Thus, in building a hypothetic stakeholder role distribution model, it is important to identify a set of stakeholders. The following two main groups have been identified:

1. Stakeholders from the health sector include:
    a. Health professional associations
    b. Associations of healthcare institutions
    c. Academicians, research institutes
    d. Health and disability insurance entities
    e. Patient organisations
    f. Public healthcare institutions of various levels (national and regional)
    g. Private healthcare institutions including non-governmental organisations and charitable affiliates
    h. Health ICT vendors (national and international)
    i. Healthcare policy building institutions
2. Society
3. Media (national, regional, specialised)
4. Stakeholders from beyond the health sector:
    a. Public administration (e.g. registration systems, statistics department)
    b. Ministry of Transport and Communications in charge of IT communication measures, and other regulation institutions
    c. Private ICT sector (infrastructure and service providers)
    d. Education, social welfare and community services sector
    e. Security and civil safety sector
    f. Innovation, industry and research sector
    g. Treasury and finance
    h. International organisations (e.g. European Commission, World Health Organisation)

7.3.2. Element of collaboration model: emergence of the e-health stakeholder roles

The World Health Organisation unambiguously defines the roles of all stakeholder groups in the development of the e-health system[670].

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[670] WHO-ITU (2012). National e-health Strategy Toolkit. [accessed 03-09-2014]. <http://www.itu.int/dms_pub/itu-d/opb/str/D-STR-E_HEALTH.05-2012-PDF-F.pdf>.

- Health service suppliers are aimed to take leadership, give overall direction, ensure resource management, and assist with resolution of project activity challenges (emerging problems, conflicts);
- The ministries of health should take the responsibility not only to ensure the achievement of patient health service needs but also to plan subsequent e-health system developments. It is recommended to separate the role of a funder and coordinator and this has been already realised in Lithuania.
- The function of the Ministries in charge of communication and ICT development is to provide relevant competence and resources in integrating health services in the electronic systems.
- Experts should submit recommendations on the development trends, help in planning/anticipating future needs, guide/steer the stakeholders and pursue regular checks and analysis of interim and end products.
- Public and patients are expected to provide the feedback in evaluating the end product rather than to directly participate in the task-building process.

Thus, according to the key e-health product development trends, healthcare institutions are recommended to play the role of the leader in developing the e-health systems. Whereas the ministries should be responsible for work with the stakeholders and increase their motivation in pursuing their new roles. It is expected that IT companies will be more active in participating and using their business and IT expertise rather than taking the leader's role.

7.3.3. Collective intelligence management tools

Development of collective intelligence requires specific management tools. Some of them are strictly defined; the others are more flexible.

- *Formal and informal organisational structure*. In order to create the conditions fostering the engagement of e-health stakeholders, it is very important to establish an organisational structure understandable to stakeholders. It could be both formal and informal; the most important thing is to make this system explicit, transparent and based on relevant procedures and rules. In fact, the operational rules of an organisation could be developed and approved by the stakeholder community. An organisation should not necessarily be legally regulated, it can be based on the practical experience. If this is a formal organisational structure (e.g. working group or standing committees), it should be legally regulated and open to all stakeholder groups; whereas the element of randomness in engaging one or another stakeholder shall be eliminated not only from practice but also from the declarative rules. If this is an informal organisational structure (e.g. virtual communities), the rules are usually set after developing a technological interface of interaction.

- *Task grouping.* Stakeholder interaction becomes meaningful and promotes sustainable, practical outcomes – collective synergy effect – when the interaction-based content of discussions is structured, i.e. the assignments to be addressed are highlighted, grouped and separated. This is a non-stop process until the level of knowledge on the addressed problem reaches common understanding and meets the needs of the community members.
- *The power of edges.* Quite often the efforts are made to reallocate unintentionally the practice of the hierarchical state governance to any newly established systems, including the innovative ones, e.g. e-health development. Unfortunately, such a hierarchical action, when the power of spread/initiation of ideas is by default delegated to the official state governance institutions, is not sufficient for the emergence of collective intelligence. Less institutionalised stakeholder groups, e.g. the patient or the doctor are placed on the periphery of such social networks; their knowledge is blocked in this periphery and cannot be spread further; therefore, it is necessary to establish the interaction platforms aimed to promote self-confident approach of stakeholders in the periphery and trust in other stakeholders.
- *Redistribution of power from autocratic leadership to the team.* Stakeholders in the periphery gain self-confidence and trust in the environment only when the element of autocratic leadership no longer occurs in the e-platform.
- *Encouraging participation.* In developing collective intelligence, it is very important to keep motivational efforts continuous. Stakehold-

ers then feel members of the community and show constant interest in the community achievements. Thus, stakeholders' efforts create benefit for them. Each stakeholder may perceive the benefit differently, besides the forms of perceived benefit might change in each phase. The benefit can be both, tangible/material and less tangible or wholly intangible. For instance, this could be a delay fee or newly established social relations.

- *A wide range of participants*. A wide range of participants is instrumental for the emergence of the collective intelligence. In view of this, all stakeholder groups shall find mutually important interaction elements and generate relevant benefits.

In fact, the number of stakeholder engagement/participation tools is still insufficient. In Lithuania, the most popular are hierarchy-based tools where the representation of certain stakeholder groups is fragmented. For instance, patient representatives are not engaged in the e-health projects, and their practical interest is not expected. Usually unidirectional interaction forms prevail, e.g. training, in the hope that knowledge of the proposed solutions will facilitate the resolution of other problems. Whereas participants in the periphery do not receive sufficient attention. The restrictions preventing the development of collective intelligence could be eliminated by the e-platform.

7.3.4. Hypothetical simulation of interaction and knowledge process

Application of the role theory to the e-health stakeholder collaborative team could help establish the most efficient hypothetical patterns of team roles in creating the e-health system.

Six stakeholder groups have been identified for further hypothetical modelling:

1. Ministry of Health and other public administration institutions related to the regulation of healthcare: Ministry of Health, State Patient Fund, and Centre of Registers.
2. IT company. Private capital company providing programming and counselling services.
3. HI. Healthcare institutions represented by their top managers. Decisions of this stakeholder are usually of major strategic importance.

4. Medical personnel, including doctors and nurses providing direct medical services.
5. HI specialists. Specialists of healthcare institutions not directly involved in the provision of medical services, i.e. IT specialists, finance officers and middle-level managers.
6. Patients, i.e. users of medical services.

The six main groups are sufficient to reveal the main role division trends. Each stakeholder group can take more than one function, yet the model embraces the division of the most characteristic functions. The patients' role will not be further considered in the model since their role is not subject to the knowledge generation cycle. The patient is either client or observer/evaluator.

Each e-health idea/decision is subject to the same knowledge management phases. Both in developing the e-health strategy and in creating a specific e-health service, the process passes through the same phases from the idea to its realization: collection of pre-knowledge, processing of the associated knowledge, development of new knowledge etc. It is understandable that duration of each phase might differ, however in this hypothetical simulation we'll assume that the length of all phases is the same. Simulation is further developed pursuant to the essential precondition: a healthcare institution and its personnel are the main users and owners of the e-health product. Therefore they take on leadership roles. This means that functions covering performance coordination, idea generation or functions requiring specific medical knowledge are divided among the HI staff members (top managers, medical personnel or other specialists). Hypothetical Theoretical division of stakeholder roles is presented in **Figure 7.5.**

Thus, during the phase of **accumulation of pre-knowledge** it is necessary to collect all the available knowledge both on the existing technologies and stakeholders and on the changing needs. Ideally, the Ministry of Health (MoH) could play the role of a coordinator of this phase for not all the stakeholders might be identified by then or aware of their roles. HI might realise the importance of specific e-health knowledge for they understand that concrete electronic solutions are necessary for the organisation. This could be realised if HI top managers undertake the shaper's role. Medical personnel being well aware of health technologies and directly communicating with the patient is equipped with relevant professional knowledge; HI specialists get prepared for the realisation of e-decisions. Whereas IT company can play the role of an observer preparing for the realisation of future decisions. At the same time, the IT company could be evaluated from the perspective of specialists providing their expertise on the current IT solutions.

The collected information is analysed during the phase of building the **associated knowledge**; the information is personified, adapted to the current situation and shared until the accumulated knowledge is equally interpreted by all stakeholders. MoH retains the role of a coordinator and shares management resources; the medical personnel takes up the shaper's role and informs on the needs; whereas HI top managers share the knowledge on management as specialists. Functions of all other groups remain unchanged.

During the **new knowledge** building phase the IT company could be treated as a shaper; together with HI specialists (in this case with implementers) it could seek relevant solutions and their new forms in order to achieve the goals of the medical personnel. Thus, in this phase medical personnel should play the role of a coordinator. MoH also plays a significant role and shares the specific knowledge complying with the policy and public administration requirements. Here the role of the heads as monitor evaluators could be considered as passive, yet this role is very important for project quality.

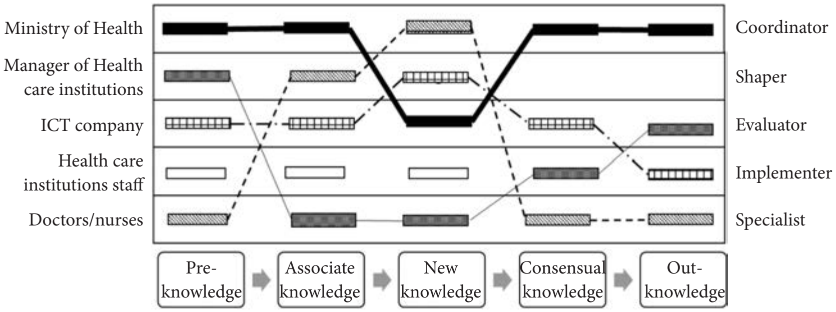

Figure 7.5. Hypothetical Theoretical division of stakeholder roles: roles division among e-health stakeholders during Knowledge management cycles

Consensual knowledge is related to the negotiations between the parties representing different attitudes, to the post-analysis solutions, refusal of alternatives and selection of a specific alternative. During this phase, MoH could act as an evaluator and provide space for stakeholders to seek consensus without making any external or political solution. Whereas medical personnel is in charge of process coordination.

During the **Out-knowledge** phase, MoH can again act as an evaluator whereas HI top managers can play the shaper's role. In fact, during this phase the parties as if a return to the first phase roles, except HI specialists who are in charge of the quality of the developed product; therefore they pursue the function of an evaluator.

Summary

In developing the e-health platform for stakeholder cooperation, it is important to disclose all the elements of the model for the promotion of the engagement/participation by creating a favourable environment for team-role building.

When the e-health platform for stakeholder cooperation is based on the assumptions for the development of collective intelligence, management phases will not be detached and the moment when relevant understanding occurs will not be immediately identified. But if bulk data is accumulated properly and interface measures are ensured, the platform could function as a collective intelligence generation place.

In the e-health platform for stakeholder cooperation, the stakeholders will act without the pre-assigned roles. Their initial contribution will remind that of specialists, but in the long run and in platform interaction the team roles should start emerging naturally as the collective intelligence. Yet, if more rapid processes are pursued, efforts could be taken to systemise knowledge management processes where each stakeholder could be encouraged to play a certain role and identify with that role.

7.4. Model of the e-health platform for stakeholder cooperation

The aim of the e-health platform for stakeholder cooperation (PSC) is directed toward management of e-health changes in order to collect the stakeholders' knowledge, base further discussions on this knowledge and present the outcome of the collective intelligence as out knowledge (proposals) for further discussions and evaluations; if the agreement is reached these proposals should be submitted to the practitioners for implementation.

7.4.1. Need for new principles in building interactive collaboration platforms

Development of various e-cooperation platforms is based on the three access patterns:

- One of them is **discussion forums** and the possibility to provide comments. Discussion forums provide space for reading and participation when information and contribution of the user are set out in a chronological manner where information is not otherwise sorted or processed.
- The second is **search systems** which by the algorithms **provide relevant information** via software systems. Here the tree principle is applied when information is sorted by the conceptual significance and is presented to the user (Google search).
- The third is **ideation tools.** This platform is often used in the collective intelligence systems and is called the Idea Management System.

According to the scientists, the existing IT cooperation platforms based on "flat" discussions are insufficient to reach collective intelligence and generate knowledge[671]. Such flat documents are usual during forums where communication is based on comments (e.g. Facebook, news portal Delfi). Such a sequence of conversations is attractive for quick exchange of views or information. Unfortunately, this doesn't provide additional information about logical meanings of arguments and significance of ideas. But even in the above discussion forums information about the logical links does exist; simply in order to explore this information it is necessary to get special access mechanisms which so far are not frequently used. Although the idea management systems are close to the emergence of new knowledge and intelligence, they only partially meet knowledge management needs.

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[671] Buckingham Shum, S., De Liddo, A. and Klein, M. (2014). DCLA Meet CIDA: Collective Intelligence Deliberation Analytics, Workshop: 2nd Int. Workshop on Discourse-Centric Learning Analytics at 4th Int. Conf. on Learning Analytics & Knowledge., Indianapolis, USA.

The main shortcoming of the above systems is the need for a manager or intermediary. Intermediaries are in charge of serving, grouping and analysing the ideas; this is a long and time-consuming process hindering the necessary interactive maturity of the collective intelligence and feedback. For instance, Klein describes Google experience[672] when the company had to recruit 3,000 employees to filter and consolidate 154,000 posts they received in a process. For Google, it took 9 months to accomplish this task. Such a performance denies the principles of formation of the collective intelligence.

In view of this, it is necessary to introduce new mechanisms, e.g. reflective deliberation tools. Therefore, new trends cover the platform models when they are based on deliberation[673]. It is necessary to introduce the mechanisms which could facilitate discussions, communication and collaboration, as well as the creation of new ideas in real time.

Establishment of collaboration platforms could be based on the gained experience when various IT-based mechanisms are developed to meet other health needs. There are multiple attempts to establish virtual platforms based on the personalised decision support systems. They not only provide additional access to health resources and information sources but also give the possibility to users to create health scenarios and make individual decisions on disease prevention[674]. Such platforms provide for coordination of user (person interested in own health) and health administrator needs, automated decision-making, communication and transmission of information.

Quite an extensive experience was gained in developing computer-supported learning and artificial intelligence and education system. Here the collective intelligence is accumulated by applying various analysis systems, e.g. syntactic analysis (rule-based approaches that find syntactic patterns in argument diagrams); problem-specific analysis (use of a problem-specific

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[672] Klein, M. (2012) Enabling Large-Scale Deliberation Using Attention-Mediation Metrics. *Computer Supported Cooperative Work* 21: 449-473.

[673] Buckingham Shum, S., De Liddo, A. and Klein, M. (2014) DCLA Meet CIDA: Collective Intelligence Deliberation Analytics, Workshop: 2nd Int. Workshop on Discourse-Centric Learning Analytics at 4th Int. Conf. on Learning Analytics & Knowledge., Indianapolis, USA.

[674] Calvillo, J., Roman, I., Roa, L.M. (2013). Empowering citizens with access control mechanisms to their personal health resources. *International journal of medical informatics*, 82(1): 58–72.

knowledge base to analyse arguments); simulation of reasoning and decision making processes (qualitative and quantitative approaches to determine believability/acceptability of statements in argument models); assessment of content quality (collaborative filtering to assess the quality of the contributions' textual content)[675].

Despite the number of successful examples, their implementation revealed the main functional errors in the collective intelligence platforms.

Visualisations: visualisation exercise is the most difficult work. It could be facilitated by images, photographs, films and other graphical tools. This shortens the perception time and increases the attractiveness of the idea; finally this can keep the user connected to the system for a longer time. Besides this could help better understand the situation under analysis compared to the pure digital information. Restrictions should also be taken into account. Visualisations as awareness-building tools may lead to errors or undesirable/unforeseeable consequences. Although such visualisations are relevant in any knowledge development phase, the major benefit could be discerned at the very beginning when ideas are absolutely new, "fresh" and non-incubated. This is also relevant when an inexperienced user joins the community.

Perception of the whole and understanding the whole. The perception of the whole is an important factor in order to change it, but this task is quite complicated and can rarely be accomplished without the additional instruments. In fact, information technology is a very suitable instrument to perceive the whole more precisely and immediately. In order to perceive the whole it is necessary to have access to the available information and posts of all platform users, and this could be done only by a very motivated actor or by a person with high degree of expertise who constantly updates the acquired knowledge. If the problem under analysis is perceived partially and a person cannot see the available content, there is a high probability of idea duplication or superficial perception of ideas. The perception of the whole is mainly restricted to shallow contribution and unsystematic coverage.

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[675] Scheuer, O., McLaren, B.M., Loll, F. and Pinkwart, N. (2012) Automated Analysis and Feedback Techniques to Support Argumentation: A Survey. In: McLaren BM and Pinkwart N (eds) *Educational Technologies for Teaching Argumentation Skills.* Bentham Science Publishers, 71–124.

Dangerous idea ratings. Idea ratings are often easily accessible, but most people are likely to evaluate only a tiny fraction of the ideas, usually the ones at the top of the list: usually the first ideas get more attention compared to the subsequent ideas. The above idea ratings and their average estimates don't reflect the actual situation and don't create collective intelligence. If this is the case, some stakeholder groups can game the rating mechanisms in order to manipulate which ideas rise to the top. There is also often a disconnection between the voting and the idea evaluation criteria. Sometimes platform users cannot understand these evaluations although they participate in the evaluation process. They can't understand the relationship between the idea ratings and the selection/evaluation of criteria.

These obstacles restrict participation growth and, in the long run,, might lead to participation interferences.

7.4.2. Examples of interactive collaboration platforms

The major search engines like Google, Yahoo or My Search could be treated as the predecessors or analogues of the interactive collaboration platforms. The evolution of computer networks determined the emergence of multiple virtual communities. Their members communicated via interactive tools in pursuit of minor goals, and products were mainly designed for leisure time and personal social relations. Facebook and LinkedIn are among the most popular networks. Following the success of social network platforms, major search giants also started developing cooperation platforms. For instance, in 2009 Google introduced a new discussion platform Wave and presented it as a software framework for real-time communication and cooperation[676]. Cooperation platforms are being developed across the globe. For instance, the literature describes an on-line pluralist platform for democracy adapted to the cultural context of Singapore[677]. It contains the argumentation system based on the principles of the Issue Based Information System[678].

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[676] Google. (2010). About google wave [accessed 04-12-2014]. <http://wave.google.com/about.html>.

[677] Li, Y., Zhang, W., Perrault, S. T., & Zhao, S. (2015). *Building an online deliberation platform – Bottom-up civic engagement in Singapore*. CHI 2015, Seoul, South Korea.

[678] Klein, M. (2012). Enabling large-scale deliberation using attention-mediation metrics. Computer Supported Cooperative Work, p. 449-473.

Established/tested and popular among the users, platform technologies have become a research object in pursuit of rational professional community goals. Development of stakeholder platforms, collaboration, and citizen engagement platforms is among the national and international priorities in developing effective platforms.

During five recent years, the world has developed and piloted multiple cooperation platforms for different sectors (private and public) and various areas (active sales, marketing, learning and policy building).

EU experience. The platform European Citizens Consultation (ECC) was introduced in 2009 as a forum to put forth and discuss the ideas on social and economic future of Europe. The stated aim of the project was not only to engage the EU citizens in the debate with policy makers but also to give them a voice and the possibility to participate in decision-making. According to the researchers, this was a rather successful attempt. The number of website visitors amounted to 150 000, the registered users to 29 536; 5640 messages and 1142 proposals were counted on of 5640 proposals were counted on ECC websites[679].

This gave an impetus to a broad range of research related to the computer-supported and real-time operating cooperation platforms. In the context of the EU strategic research priorities, these platforms were introduced in the Seventh Framework Programme (2007-2013) and were referred to as Collective Awareness Platforms for Sustainability and Social Innovation.

Being perspective this research is being further developed, whereas research priorities have been transferred to the new EU research programme Horizon 2020 defining the main advantages provided by these platforms (grassroots)[680].

The Seventh Framework Programme supported the implementation of 13 initiatives; three of them were aimed to develop specific platforms. On

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[679] Kies, R. and Wojcik, S. (2010). European Web-Deliberation: Lessons from the European Citizens Consultation" in De Cindio F., Macintosh A., Pearboni C. (eds.), From e-Participation to Online Deliberation, Proceedings of the Fourth International Conference on Online Deliberation, OD2010. Leeds, UK, 30 June-2 July, pp. 198-211. [accessed 04-12-2014]. <http://www.certop.fr/DEL/IMG/pdf_Proceedings_OD2010-2.pdf>.

[680] Sestini, F. (2012). Collective Awareness Platforms: Engines for Sustainability and Ethics. *IEEE Technol. Soc. Mag.* 31(4): 54-62. [accessed 17-12-2014]. <http://caps2020.eu/wpcontent/uploads/2013/11/Collective Awareness PlatformsEngineforSustainabilityandEthics1.pdf.>.

behalf of EC, Sestini[681] reviewed the above initiatives and provided an extensive list of achievements. The majority of them are related to practical usage.

The main EU projects include[682]:

1. Project CAP4ACCESS (Collectively improving accessibility in European cities) is aimed to reduce the barriers to inclusion. In order to improve accessibility of European cities, the project developed a range of tools and methods for documentation and discussion of locations and routes within the built environment to improve accessibility for people with limited mobility; visualizing the data in ways which are intuitive for target users; route planning and navigation for people with limited mobility; and sharing the understanding on the evaluation of a new access tool.
2. Project DECARBONET is directed toward raising collective awareness about environmental challenges. The platform aims to engage the stakeholders in the requirement elicitation, encourage the users to register with the platform and integrate various interactive elements such as Energy Quest/Climate Quiz, and involve social media, users.
3. Project WIKIRATE enables citizens to rate companies on corporate social responsibility. Evaluation is based on the crowdsourcing principle via atomisation of information.
4. The CATALYST project develops measures facilitating debates in virtual communities. Developers of this platform model do not seek to duplicate existing functionality but add new tools facilitating the emergence of collective intelligence by connecting wiki technology, social network services, discussion platforms and discussion tools.
5. Project D-CENT is aimed to facilitate dissemination of social innovations in virtual communities and provide the tools for direct democracy and economic empowerment. This platform was piloted in Island, Finland, and Spain. The platform is based on authentication and data collection, it provides social networking opportunities and

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[681] Sestini, F. (2014). Collective Awareness Platforms for Sustainability and Social Innovation: An Introduction, p. 79, [accessed 04-12-2014]. <http://booksprints-for-ict-research.eu/wp-content/uploads/2014/07/BS5-CAPS-FIN-003.pdf>.

[682] <http://ec.europa.eu/digital-agenda/en/caps-projects>.

ensures privacy.

Another group of platform development projects was aimed to coordinate and support the activities.

1. Project CAPS 2020 is aimed to organise annual meetings of the analogous platforms designed to advancing the inclusion of citizens.
2. Project IA4SI is aimed to evaluate the impact of the already established platforms.
3. Project SCICAFE2.0 develops new collaboration, models.
4. Project WEB-COSI aims at increasing trust in collectively-generated statistics.

Lithuania's experience

The review of the efforts for better public engagement via virtual tools prevailing in Lithuania revealed low development level and low awareness on the IT possibilities. So far the "flat" measures are observed, e.g. the internet websites providing the possibility to find relevant information and present personal views. One can hardly find the requirements imposed to cooperation platforms. Certainly the achievements in the area of healthcare should not be ignored. Here it is necessary to highlight the internet sites like http://www.sergu.lt/ (possibility to register with the professionals of the selected area in Lithuania, yet only in 20 Lithuania's out-patient institutions and hospitals; http://www.manodaktaras.lt, http://e-pacientas.lt (website of the dental services company and its partners); http://www.pincetas.lt (doctor ratings provided by patients and doctors' colleagues); http://www.skundai.com (possibility to post a claim on companies and services (including treatment services); http://sveikas.lt/lt/ (information on health issues) and other sites.

However, the major drawback of the above sites is their unidirectional nature, i.e. the users are not provided the possibility to get feedback, discuss and share their changing views.

7.4.3. The model for management of the e-health platform for stakeholder cooperation: idea generation and maturity cycle

The e-health PSC model is based on the life-cycle of an idea where the main object of management is the idea passing through all knowledge management cycles starting from the idea generation and finishing with augmenting idea maturity. Ideas are perceived both as positive statements sounding like a new thought and aimed to describe or replace the current state of e-health and as a negative statement which may sound like a claim or criticism. The idea management task is encoded in the e-health PSC management model.

The e-health PSC **management model** is a sequence of actions which will serve as the basis for the establishment of the platform's interactive internet interface, including testing and deployment.

The **aim** of the e-health PSC management model is to provide a detailed scheme to connect, via mutual relations, the stakeholders' views with the multi-criteria e-health system elements by specifying the hierarchy of the evaluation criteria of the e-health as a system, anticipating their peer-review and ensuring the feedback for system users.

Stakeholders' views and their knowledge in the initial submission stage acquire the form of proposals or claims (problems). Based on the knowledge management construct, in the e-health PSC management model scheme the ideas are the main object of management, and their management creates a continuous idea generation and maturity cycle (**Figure 7.6**). Cyclical idea development, complement and re-wording guarantees both the feedback to the stakeholders and the necessary interface between the workflow elements.

Elements of the management model

Elements of the management model imply the smallest management unit the implementation of which requires a specific one type action.

The interface between the management model elements: a set of actions which are connected by one type action group.

Alternative proposals: any idea formally expressed by an e-health user which may sound both as a proposal to solve current problems or correct mistakes or as an alternative to the available e-health solutions. Alternative proposals, if expressed in one sentence and supplemented with a brief description (if necessary) are treated as the entry data which afterwards might be subject to various procedures: evaluation, analysis, discussions, re-wording, etc. By its semantic meaning, an alternative proposal is a positive statement directed toward the search for a positive change. Quite often

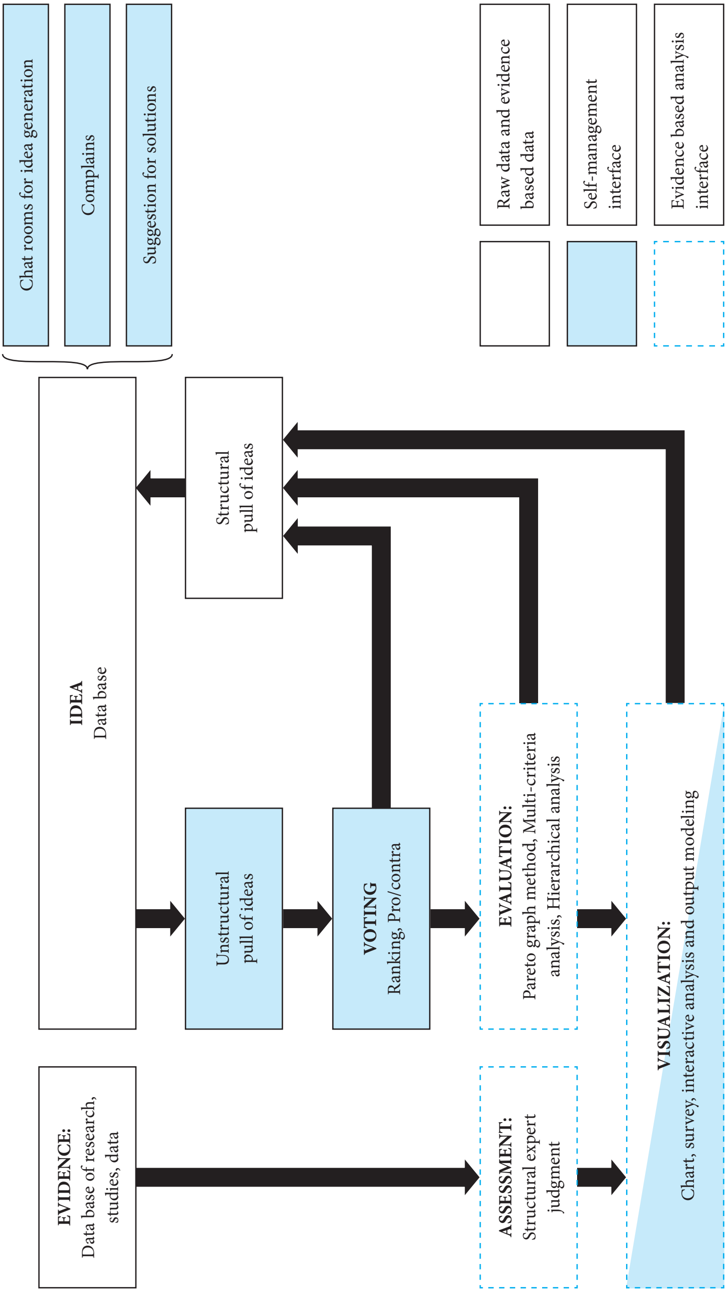

Figure 7.6. e-Health platform for stakeholder cooperation: The model for management (idea generation and maturity cycle)

creativity is promoted by negatively worded proposals and in this case they are referred to as problems (claims).

Problems (claims): any failures identified by the stakeholders and considered as obstacles preventing from functioning of the e-health system. In this case, the stakeholder can provide only a description of the problem without indicating the ways of positive problem solution. The list of the problems could be further analysed according to the same principles as the idea evaluation. At the same time, problem wording can incite the search of positive ideas.

Self-organisation: empowerment of the users promoting corporate responsibility for the joint action. Such an activity increases the motivation of users and provides the possibility to select own operational patterns and make better use of the creative powers.

Phases of the management model

During the first phase of proposal/problem submission, the stakeholders are free to formulate the ideas and decide what form (alternative proposal or problem) they should be attributed to. This is the way how the bank of ideas (database) is established for further actions.

The main interface of the elements of the e-health PSC **management model** include:

- **The interface for the collection of information and science-based data provided by the e-health stakeholders**

The data repositories containing various information. Each data repository shall provide space for interactive communication. Thus each user of the platform can make a post or execute analysis by attributing one or another evaluation criterion. It is recommended to specify three types of repositories: the repository of stakeholder ideas, the science-based data repository and the repository of structured ideas. The stakeholder repository would store the collected information including non-structured user ideas and the ideas that passed through various analyses. The repository of the structured ideas is a derivative of the idea repository.

It collects only the ideas which have passed through the entire idea evaluation cycle, from the birth of an idea to the idea generation, maturity, specification, and peer-review.

- **Linking the entry with the self-organisation** provides the possibility to the stakeholders to make solutions and participate in the interactive management of the e-health content and its evaluation criteria.

The self-organisation link ensures regular data flows to the repositories and, consequently, their dynamic nature, i.e. the collected information reflects the e-health system changes in real time with respect to all stakeholders. The self-organisation includes entry (submission of ideas), b) idea evaluation and c) interactive analysis modelling.

a) There are three ways to complete the repository. Two of them are direct: one is for the submission of alternative proposals, the second for the submission of claims. It is important to highlight the two types of idea forms because their emotional content is different. Claims are usually related to the flow of rather negative information which is often based on emotions; it could, therefore, become an additional source of creativity, i.e. a user who wants to post the claim might have had a painful experience in connecting to the imperfect e-health system and this might have hindered smooth system operations. Whereas alternative proposals are positive, quite often these are notifications for improvement based on the analysis or an extensive experience. The stakeholder cannot always (at a particular moment) precisely formulate an own idea and this is due to several reasons (lack of the right concepts, lack of preciseness or doubts in own experience, etc.). In situations when both the claim and proposal are not explicit, or when their wordings are not perceived unambiguously, the users are given the possibility to discuss and check their doubts or ideas with their peers or opponents. Thus, peer-reviews are instrumental in this respect. They could help the users formulate alternative proposals or claims more explicitly. This is the third way to generate the ideas. Discussion-based ideas are transferred to the bank of ideas (by the user or expert decision).

b) Idea evaluation phase includes the user's right to rate all the ideas presented in the repositories. The rating is based on the voting procedure when the user gives preference to some ideas over the others. The users can rate both their own and other people's ideas and can do this more than once. Thus, they are provided with the possibility to change own opinion. In a new voting, their rating is annulled and only the new rating is subject to a new analysis (the user is informed about that). For user voting, the list of non-peer-reviewed (non-structured) ideas will be provided.

c) Partially the interactive analysis modelling is part of the self-organisation link when the user is empowered to model output forms and ways of analysis by giving the possibility to step back and change the entry data. The user can also choose the format of idea rating and forms for visualisation of graphics and statistical analysis. The possibility is also provided to consider all the analysis elements or ignore some of them if this is the user's decision. It is also possible to group the analysis outcomes by various indicators, e.g. by the interest groups. This is good opportunity not only to increase awareness of the e-health problem but also to identify expectations of each interest group. Peer-reviewers can change the other part of visualisation.

- **Evidence-based analysis and output interface.** The evidence-based analysis and output interface consists of three management blocks. It is the analysis of the stakeholders' ideas through diverse decision support systems, the peer-review based on the latest scientific knowledge and visualisation of the analysis.

a) **Analysis of stakeholders' ideas.** One of the most simple and fastest would the Pareto table analysis. **Pareto analysis** is a decision-making method based on statistical analysis and selecting a number of actions that deliver a total benefit to the problematic situation[683] (Mikulskiene, 2011); it is based on the Pareto principle 80–20%. For the execution of Pareto table analysis participants' voting results are used and most urgent problems or proposals are identified. Identification of the level of significance is left to the user and for self-organisation aims. It is also important to integrate other decision support systems based on a multi-criteria analysis (in separate cases on the hierarchical decision analysis). **Hierarchical analysis method** is the method of multi-criteria decision analysis applicable when the problem under consideration is of a multilingual nature, is described by

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[683] Mikulskienė, B. (2011). Decision making methods for public management (Sprendimų priėmimo metodai viešajam valdymui). – Vilnius : Mes, – 267 p. : ISBN 978-609-95202-3-0.

the exhaustive set of aims, and when alternatives are evaluated in pairs[684] (Mikulskiene, 2011). For a multi-criteria decision analysis, the additional entry windows are necessary, e.g. identification of the criteria and identification of their weight.

b) **Peer-review based on the latest scientific knowledge.** Non-structured ideas are presented for the analysis of the acknowledged experts (usually the scientists) using the methodology of a structured peer-review[685, 686]. This evaluation is based on the principle that during the idea evaluation the scientists present the risks for the realization of ideas and the anticipated probability of these risks. Experts can also present the ideas and their evaluation. If experts want to rate ideas via voting, they participate in this process with the same rights as other stakeholders.

c) **Visualisation of analyses** makes the analysis interactive and raises awareness of the analysis outcomes and possibilities for interpretation. In this phase it is possible to choose visualization forms (graphics, tables, pictures); there is also a possibility to comment one or another interpretative submission form by creating the outcome data modelling opportunity for each user. Here there is a chance to see the differences between the users and peer-reviews.

The platform functions according to the virtual collaboration principle by engaging the stakeholders in one network. Communication in the networks allows to identify the connected stakeholders, their communication topics, and relationships. This network becomes an experimental laboratory which allows to observe and analyse stakeholders' communication process.

7.4.4. Elements of the platform content: input and output interface

For platform administrators, researchers and platform users it is important to know what information and how it will be generated. Thus, the platform input/output interface is a scheme demonstrating the data of input/out-

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[684] *Ibid.*

[685] Cooke, R. (1991). Experts in uncertainty. Opinion and subjective probability in science, Environmental Ethics and Science Policy Series, Oxford University Press, New York, 1991.

[686] Goossens, L., Cooke, R., Kraan, B. (1998). Evaluation of weighting schemes for expert judgment studies, in: A. Mosley, R. Bari (Eds.), PSAM4 Proceedings, Springer, New York, p. 1937–1942.

come. It is presented in **Figure 7.7.** This is an information management tool aimed to improve the future of the platform in case of new analysis needs.

The interface tree consists of:

1. Stakeholders' data
2. Research data
3. Chat room data
4. Alternative proposals data
5. Claim data
6. Voting data

To make platform operating as a collaborative platform where joint efforts contribute to the e-health data collection and to the realisation of the decisions, trust between the platform users and better awareness of the problems is instrumental. The connection between the awareness and effectiveness of collaborative activities has been proved[687]. This is also highlighted in the collective intelligence theories. Collaboration and trust are possible when participants know whom they communicate with and what the members' competences are. In view of this, it is important to create a platform where the members could identify themselves according to the pre-set criteria relevant for knowledge accumulation. For instance, it is important to know what interest groups are represented, what are their job positions and job experience on the subject under discussion. Therefore the input data in the platform is based on the participant identification profile, and data about them is accumulated in the database.

Each element of the interface tree complies with a certain entry window.

The output interface consists of:

1. Stakeholders' list
2. List of research
3. List of discussion topics and idea verification material
4. List of proposals
5. List of claims
6. List of structured ideas
7. List of the analysed ideas, and a list of indicators against which ideas could be evaluated.

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[687] Carroll, J.M., Neale, D.C., Isenhour, P.L., Rosson, M.B., McCrickard, D.S. (2003). Notification and awareness: synchronizing task-oriented collaborative activity. *International Journal of Human-Computer Studies, 58(5): 605-632.*

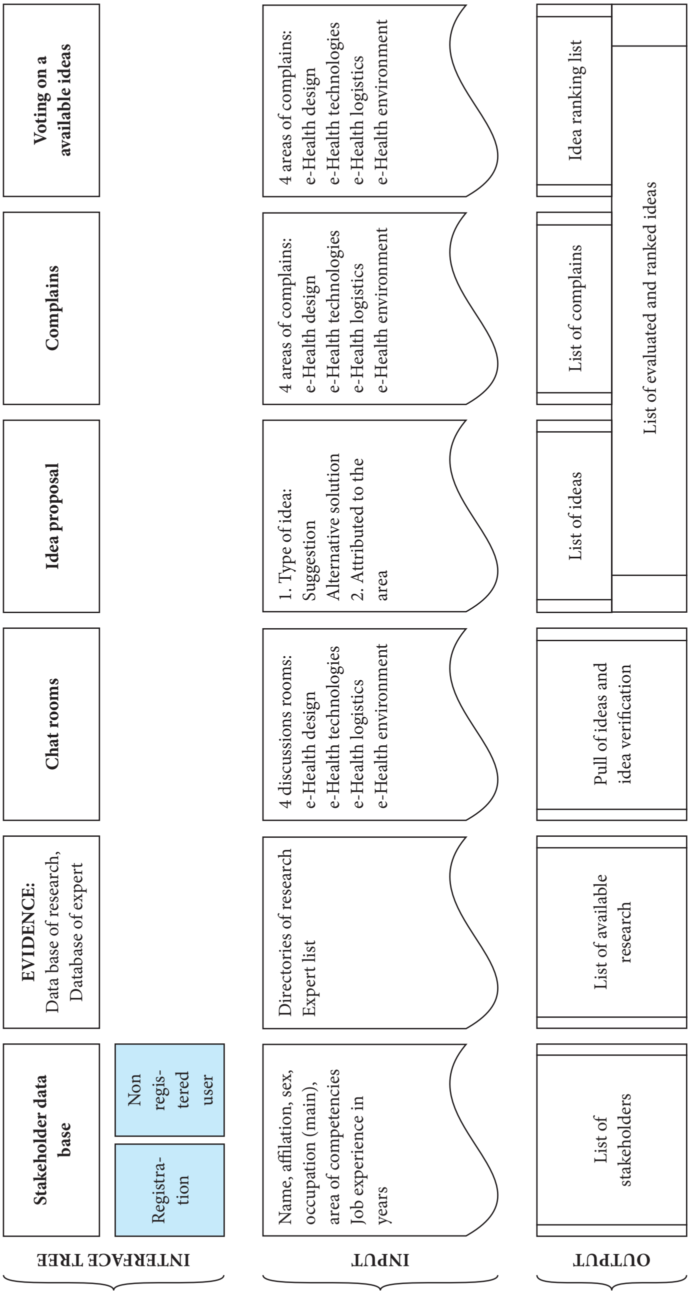


Figure 7.7. e-Health platform for stakeholder cooperation: input and output interface

7.4.5. Benefits of the e-health platforms for stakeholder cooperation

The suggested model of the e-health stakeholder cooperation model highlights the basic benefits which are achievable when the e-platform becomes a live and interactive instrument.

Several levels of benefits of the e-health CP could be specified. One of them is related to the benefits which are an integral part of the entire e-health system. Another level is characteristics of benefits of the sought e-health outcomes. The interface of benefits and outcomes is presented in **Figure 7.8.**

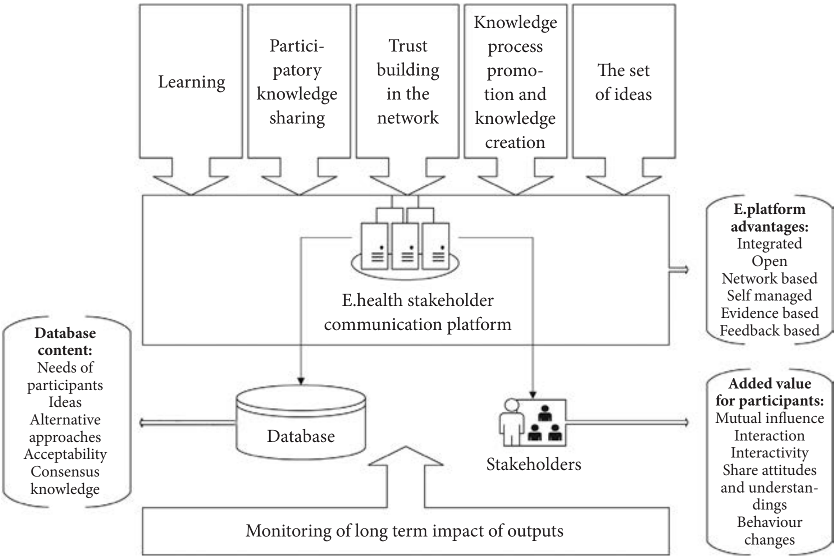


Figure 7.8. Benefits of the e-health platforms for stakeholder cooperation

The e-health CP generates the following benefits assigned to the e-health system:

- Learning. Learning, new experiences, and knowledge are determined by participation and engagement and create a new social reality dependent on innovations which are faster absorbed by the users and participants of the e-health system.
- Knowledge sharing. If the appropriate infrastructure is in place, the accumulated knowledge becomes widely accessible and open;

there is no risk for this knowledge to be locked by the privileged users.

- Network based on trust building. In an e-platform, there is the possibility to communicate and cooperate by creating a reliable space for actions. Trust between the members is a sensitive factor determining the occurrence of other benefits.
- Acceleration and knowledge co-production. In the trust-based networks, new knowledge and new ideas are developed.
- Idea collection. Ideas are collected via joint actions and creation of new knowledge; ideas can be generated, incubated, and later used to improve actual life situations.
- Monitoring the progress. The e-platform becomes a repository of information which accumulates historical posts of joint actions allowing to check formal and informal performance outcomes at any time. Having established the monitoring criteria, we can periodically monitor even the formal elements directed toward state governance decisions.

Three types of the e-health CP outcomes could be highlighted: performance of e-platform, information contained in the platform and benefits of stakeholders.

The types of the e-platform include:

- Integrated
- Open
- Networking
- Self-organised
- Evidence-based
- Providing feedback

Information accumulated in the e-platform is valuable from the content point of view:

- Participants' needs
- Ideas
- Alternative proposals
- Acceptance information
- Consensual knowledge

Added value to participants:
- Reciprocal effectiveness
- Interoperability
- Interactivity
- Possibility to exchange views
- Improvement

7.5. Testing the e-health platform for stakeholder cooperation

The established e-platform promoting stakeholder cooperation has been piloted by simulating the real platform performance conditions.

The **aim** of piloting the e-health cooperation platform was to test the practical significance of the structure and management model of the e-platform and encourage health professionals to cooperate in the search for e-health solutions.

7.5.1. Plan/methodology for testing the e-health platform for stakeholder cooperation

E-platform was tested during the "Health System Development Perspectives" on 28 October 2014 in Mykolas Romeris University. E-platform testing methodology was created (**Annex 1**). The methodology is based on the three phases (**Figure 7.9**).

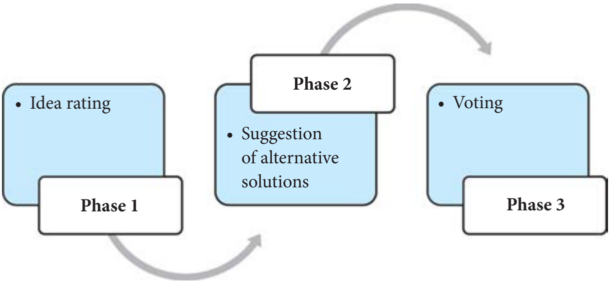


Figure 7.9. Phases of testing e-health platform for stakeholder cooperation

- **Phase 1.** Rating of ideas

This phase is aimed to vote for the most frequent e-health problems by evaluating their relevance. 23 problem wordings/statements have been presented for voting. These problem wordings have been collected in advance from the qualitative research data under the following research categories: human resources – IT literacy and other competencies; organisational structure of the healthcare institutions; leadership; qualities of the selected e-health decision; infrastructure; financial management; legal regulation of the e-health system and the role of IT companies. The presented statements were rated by their significance using a five-point Likert scale. Since voting was based on the statements collected during the qualitative research and following the respondents' wordings, these statements were subjective and had emotional implications. The users also had the possibility to present wordings of their problems.

During this phase, voting for the proposed problems is individual and interface opportunities are not provided. After an individual rating of statements, a brief analysis of voting results is carried out: the list of the rated problems is presented to the users for discussion.

- **Phase 2:** presentation of own alternative solutions. Solutions are suggested to earlier rated e-health problems.

In this phase, the users are divided into three interactive groups. The three groups are given three areas for discussion: implementation of the e-registration module; realisation of the e-history module, and implementation of the ePrescription **(Figure 7.10).** The statements are selected as the most significant – during the qualitative research they've been most frequently highlighted by the respondents as raising serious doubts. The following three statements were presented from the list of the most frequent problems rated during the first phase:

1. New management form suggested by the e-health system and implementation of the organisational structure is delayed; work methods are the same as before the deployment of the e-health decision.
   - The statement pronounced during the research: "e-health is a radical change in the institutional management; staff members should be prepared for that and act beyond the framework of daily routines; they have commitments to pursue daily tasks and

at the same time they have to consider their actions after deployment of the IS". (doctor).

2. IT companies avoid responsibility therefore they "save their energy".
   - Respondent of the qualitative research: "In fact, there is no other choice. For instance, there is no general understanding of what is meant by the e-health, the understanding is vague; everybody thinks that it will be enough to incorporate somebody else's products, grasp the hands and everybody will be happy. In fact, it is not so." (deputy head of healthcare institution).
3. Lack of awareness about the e-health IT solutions in all the chains (top management, doctors, nurses).
   - Respondent of the qualitative research: "Lack of relevant systemic understanding; it is actually in place; the worst thing is that some leaders do not realise that, this is the main problem; in other words, this is to do with the human factor….not only receptionist with narrow functional duties; the medical personnel with higher functional obligations..." (head of IT company).

Members of the group were asked to hold discussions and present afterwards at least five alternative solutions to solving the presented problem.

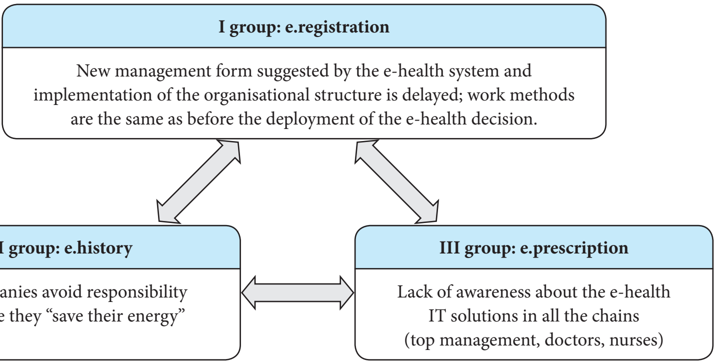


Figure 7.10. Distribution of topics and problems pertaining to Phase 2 testing of the e-platform

- **Phase 3.** Evaluation of problem solutions formulated during Phase 2 via voting procedures.

During this phase, the participants of all groups vote individually for the alternative solutions proposed by all (including own group) the groups. The voters are given limited time period; they are asked to vote only for one alternative from the list of alternatives to one group.

Prior to voting, time is given to discussing the achieved results.

During each phase, demographic information of participants is recorded. In Phase 1, when participants act individually, their age, gender and position (assignment to the stakeholder groups) are recorded. The following groups were proposed: doctor/nurse/worker of IT company/politician/patient. In team work, e.g. during the Phase 2 the size of the group and prevailing stakeholders are recorded.

Quite often one person represents several stakeholder groups, e.g. doctor can be both the administrator and scientist. In such a case the voter himself/herself is allowed to decide which position to represent.

7.5.2. Procedure of testing the e-health platform for stakeholder cooperation

The experiment involved 69 participants. The majority of them represented administrators/managers (even 40 participants) of healthcare institutions. Among the participants there were 8 politicians, 6 doctors/nurses, 3 workers of IT companies or specialists of IT divisions; 12 participants attributed themselves to patients, and 2 to scientists.

The process lasted 2 hours.

During the first phase and after the problem rating the first four problems out of five were related to public regulation (**Table 7.1**).

Table 7.1. First five problems highlighted by the participants

	Problem	**Sum**
1.	Public institutions delay e-health model development works	269
2.	Lack of centralised coordination	264
3.	Incompatibility of the local e-health systems is the result of bad regulation and planning	253
4.	Huge medical personnel workloads hinder implementation of the e-health system	251
5.	Regulation of the e-health policy is too complicated; coordination procedures of new systems with MoH are very long.	249

Whereas problems related to the IT competencies and low motivation of leaders have been acknowledged as less important (**Table 7.2**).

Table 7.2. Five problems recognised as less important

	Problem	**Sum**
1.	The only obstacle to the success of the e-health is a lack of IT hardware.	186
2.	The low interest of top managers in the selection of a specific e-health solution.	205
3.	Bad distribution of functions in developing and implementing the e-health system.	207
4.	Current managerial work principles of health institutions are in confrontation with the logic of the IT solutions.	208
5.	The low interest of the heads in the procedure of implementation of a specific e-health solution.	210

During the second phase participants spent all their time for discussions; they were very enthusiastic in identifying possible problem solutions (without major discussions). Fortunately, the participants were not confined to the minimal number of ideas and suggested more than five. All the proposed ideas are presented in **Table 7.3.**

Table 7.3. Problem solution alternatives suggested during the second phase

	Group 1	**Group 2**	**Group 3**
	eREGISTRATION Proposed problem solutions ("New management form suggested by the e-health system, as well as implementation of the organisational structure are delayed; work methods are the same as before the deployment of the e-health solution")	ePRESCRIPTION Proposed problem solutions: "Low awareness of e-health IT solutions in all chains (top managers, doctors, nurses")	eHISTORY Proposed problem solutions ("IT companies avoid responsibility and "save their energy")
	Suggested alternative solutions		
1.	In establishing the e-health system, the most important thing is to change work organisation rather than computerise paper forms.	Dissemination of new ePrescription opportunities to the society.	There is no uniform national e-health model (matrix); insufficient legal regulation.
2.	To educate and encourage the internal e-health users; to educate and give more attention to the external users.	User literacy training	There is no coordination and synergy between the creators, implementers, and users.
3.	Indexation of the basic service price in the HI, which have deployed the e-registration.	Motivational/financial system (for doctors)	Lack of funds to upgrade computer competence of users.
4.	The most important thing is to engage personnel and patients.	Compulsory assistance to users.	Standardised web servers for data exchange between the different IS have not been deployed.
5.	Implementation of modules should also include process descriptions.	Obligation to maintain administrative penalties/incentives	The insufficient motivation of institutions with respect to IT deployment.

	Group 1	Group 2	Group 3
6.	Supervision and control of the implemented IT solution (after analysing the processes "before" and "after".	Recommendations to top managers and specialists.	
7.		Paper prescription fee	
8.		Additional IT personnel.	

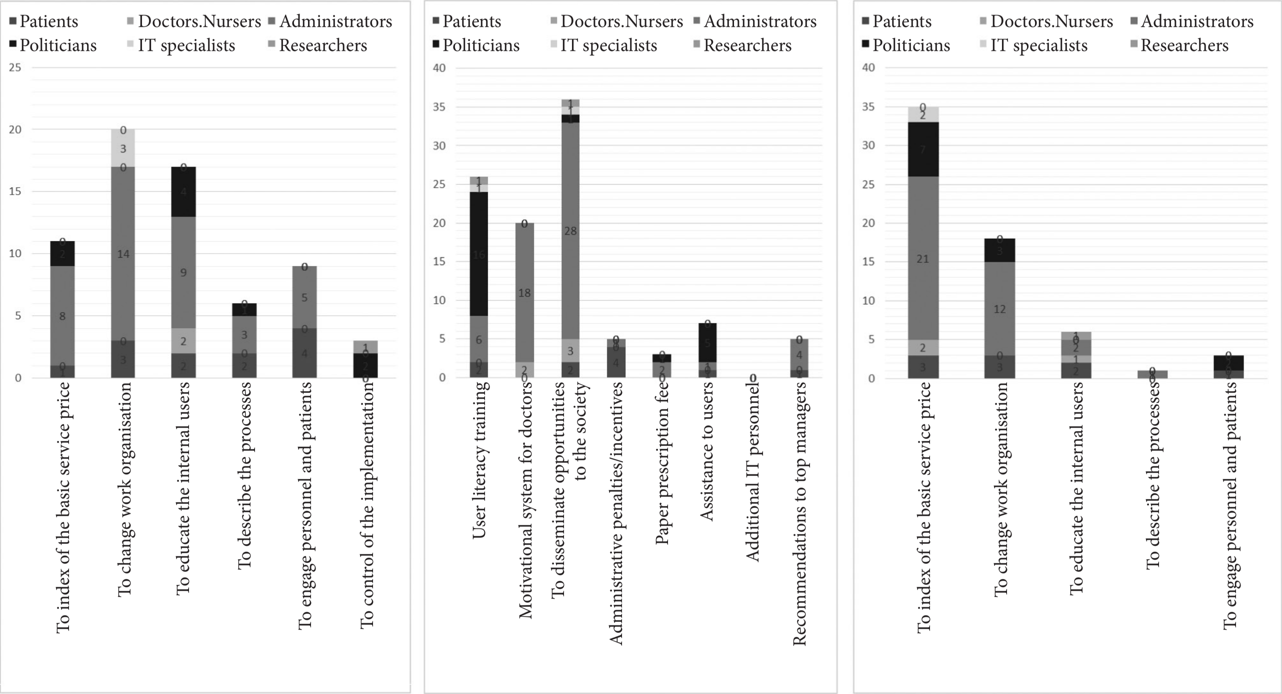
In the third phase, participants were very enthusiastic during the voting procedure and took an active part in the discussions. The absence of balance between the voters and discussion participants revealed that several participants didn't vote or voted improperly. Thus their voice was "lost". Out of the suggested list of alternatives, several dominated in each group and were more supported than others. Results of voting for the alternatives are presented in **Figure 7.11.**

7.5.3. Outcomes of testing the e-health platform for stakeholder cooperation

Testing of the integrated e-health platform was positively evaluated by the participants of the conference. During the discussions and voting procedure the participants were relaxed, creative and willing to engage in the experiment and demonstrated (during the teamwork) the trust in the organisers and colleagues.

Phase 1

During the first phase of voting for the most frequent e-health development problems, positive e-health development changes have been revealed. Today the delays of the e-health because of the lack of IT competence or lack of computer hardware are impossible. It is no longer considered that top managers do not realise the importance of the e-health. On the contrary, the heads of institutions are referred to as the initiators capable of promoting the e-health development. This demonstrates the trust between the different participants of the hierarchical e-health development system



“New management form suggested by the e-health system, as well as implementation of the organisational structure are delayed; work methods are the same as before the deployment of the e-health solution.“

“Low awareness of e-health IT solutions in all chains (top managers, doctors, nurses”)”

“IT companies avoid responsibility and “save their energy”.

Figure 7.11. Results of voting for the alternatives

which could be facilitated and supported by the e-platform. Whereas a negative attitude toward public regulation is still present and reveals quite a big gap between the above user groups. Four out of the five most relevant problems are related to the activity of the Ministry of Health. It is an attempt to identify the causes of failures by highlighting that without a uniform regulation of the e-health development, single initiatives cannot be successful.

Although the participants demonstrated their willingness in voting for the proposed wordings, none of them suggested their own problems, although they did have this possibility. This might be related to the short engagement time and to the insufficient interaction due to the lack of time. However, since an extensive quantitative and qualitative research was carried out earlier, we believe that this research did identify the actual and scientific evidence-based problems. Whereas the actual e-health stakeholder CP will always provide this possibility and special platform management tools will constantly remind about that.

Phase 2

During this phase the participants had the possibility to communicate and discuss the presented issue in groups. The interaction opportunities were reflected in the outcomes. Participants were happy to discuss the problem and used their creative skills in selecting the list of alternative solutions. The alternative solutions submitted by all the groups are multi-faceted and cover all possible e-health development trends. For instance, the e-registration group presented two problems related to the adaptation of management to the IT solutions, one each related to personnel training, financial promotion, personnel engagement, and higher IT control. The ePrescription group gave priority to publicity and information dissemination. According to the group, people (the users) have irrational fears concerning the possible control in the future. Two topics were related to financial penalties: the first to financial promotion, learning, user instructions, and two to the IT solutions. The e-history group presented even three alternatives related to centralization and one each to financial and institutional management.

The testing demonstrated that so far for stakeholders it is difficult to perceive the essence of the alternative solutions, identify differences and create competing solutions. Therefore, most often during testing procedures participants provide highly integral solutions: they don't compete with each other and be applied all together, integrally. Usually under time pressure participants formulate alternative proposals directly emerging from the formulated problem. In view of this, more attention should be given increasing the understanding of the use of alternatives in the e-health development. This should be taken into account in developing the platform.

In considering the identified outcomes, it should be noted that some alternatives have been observed more often. For instance, financial penalties and publicity are more frequent than the performance of the related IT companies. It could seem that alternatives are directed toward the internal problems and legal regulation obstacles the solutions of which are perceived by the participants via centralization of the e-health development. Positive alternatives emerge from the actions which can be affected by the participants themselves; whereas "defendants"' alternatives criticising public governance solutions sound negative. Usually, the most negative implications were related to the alternatives establishing the responsibility of the regulator, e.g. the Ministry of Health. Managers/administrators prevailed among the participants of the experiment; they were better aware of the theoretical rather than social interface with the regulator. The additional evidence of this hypothesis is the fact that certain experiment groups raised their alternatives in the context of their activity, i.e. their suggested proposals could be realised with the internal efforts without radical regulation reforms.

Testing of the e-platform confirmed the hypothesis that the stakeholders who are not identified as network users and with whom participants do not have any social relations are perceived as an imposing threat or as unreliable. This distrust was evidenced both during the first and second stage and during the problem identification process.

Phase 3

Having reviewed the results of voting on the alternative proposals and further to the Pareto analysis (aimed to identify which problem groups fall within the most significant problem area), it was established that the first-come alternatives received the majority of votes (**Figure 7.12**). Below is the list of the key alternatives:

1. Dissemination of new ePrescription opportunities to the society.
2. There is no uniform national e-health model (matrix) and legal regulation is insufficient.
3. Necessity of user literacy training.

4. The e-health development requires changes in work organisation rather than computerization of paper forms.
5. Motivational/financial framework (for doctors).
6. No coordination and synergy between the creators, implementers, and users.
7. It is necessary to educate and encourage the internal e-health users; to educate and give more attention to the external users.

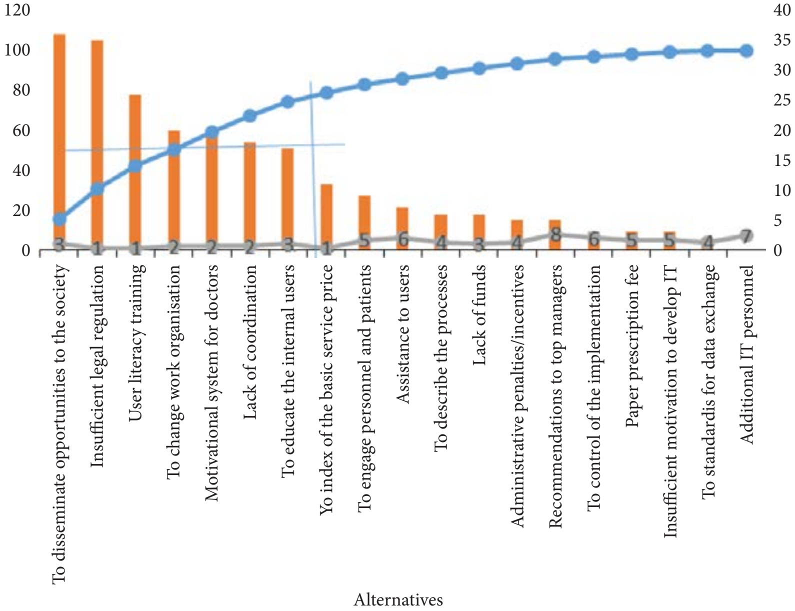


Figure 7.12. Paret analysis of Alternative proposals – problems rating by voting

The respondents were inclined to highlight dissemination and learning (IT and health literacy) via engagement. All the specified alternatives are significant with respect to respondents' motivation and indicate what values are still missing in the current system. Alongside the motivational framework, respondents emphasised the need for coordination and centralization in Lithuania.

The experiment revealed a number of theoretical tendencies in practice. For instance, it was confirmed that stakeholders are usually in favour of the top listed ideas. On the one hand the first are the ideas reflecting the most painful element of the problem, and this element is usually well known; other alternative ideas are usually related to part of the problem and are a constituent part of the solution; therefore stakeholders perceive them as secondary and don't bother to vote for them. On the other hand, the first ideas on the list require more concentration compared to the subsequent ones. Other ideas receive less effort, besides, psychologically we stop understanding the fundamental difference between the already analysed problems.

Conclusions of testing the e-health platform for stakeholder cooperation:

- The experiment revealed the necessity of an e-platform. During the experiment, stakeholders demonstrated that they are informed and have relevant knowledge on the development and problems of e-health system; at the same time they indicated the importance of the information update. The experiment showed that respondents were glad to be engaged and discuss the problems. Voting for the alternative proposals has also revealed the need for engagement and more active participation which could be treated as motivation to develop the e-health system.
- The tested e-platform benefits included:
  - Generation of multiple ideas; some of them were unexpected and could not be planned in advance.
  - Ideas emerged from the periphery (the majority of respondents were administrators and doctors/nurses from the chain of intermediaries).
  - The opportunity to switch the roles (to assume not only the executor's role but also the role of an innovator or initiator).
- IT-based collaboration systems shorten the remote social relations or establish the ties which in real life could never be developed. Since the e-health stakeholder CP is not yet operational, social relations are very rare and remote, and trust is very fragile. This was confirmed during the testing procedure. Regulators, i.e. the persons most remote from the experiment participants have been repeatedly identified as the ones at fault for e-health system interferences during all the phases. On the other hand, such a frequency of ideas shows that the community is ready for centralised solutions.

7.6. Summary

Taking into account healthcare concepts and the prevailing paradigms, the e-health is a very important instrument of the entire system, and its integral functioning tasks are described via the basic structural elements:

- to promote an integrated approach to public health problems,
- to provide adequate information to a person on his/her health, on possible health changes and principles of behaviour change,
- to act as an intermediary in providing assistance and consultations,
- to getting acquainted with the latest technology,
- to ensure adequate patient's engagement and admission of responsibility for establishing independent healthcare management principles; to raise health awareness by personalising the needs and treatment strategies.
- Prerequisites of the e-health platform for stakeholder cooperation are explained via the hierarchy of health innovations and interface of management theories where: the knowledge management stipulates the aims of the developed platform (to accumulate and analyse knowledge); management of collective intelligence defines the purpose of the e-health cooperation platform (to establish the interface between the stakeholders aimed at developing new quality of collective knowledge); the stakeholder management specifies the users of the e-health platform (who are the e-health stakeholders and how to recognise them); the team role theory helps to identify stakeholder interaction patterns and obstacles hindering the joint actions.
- The model promoting engagement and supporting participation is aimed to describe the necessary management conditions and their interfaces determining the stakeholder engagement and participation support in establishing the best e-health system solutions. Structurally the model is based on the three elements: participants, a set of roles necessary for collaboration (CR), measures for collective intelligence management (MM), knowledge management process (KMP), and interaction. The model indicates a three-dimensional nature of engagement. Effectiveness of the knowledge management process and interaction E(KMP)+I) is a dynamic function depending on the collective intelligence management tools (MM),

the completeness of the engaged stakeholder group, quality of the role-play relevant for collaboration (CR), and effective interaction E(KMP+I) = f(MM,CR,I).

- The model of the e-health platform for stakeholder cooperation (PSC) is based on the idea's life cycle where idea is the basic object of management passing through all knowledge management cycles, starting from the idea generation and finishing with the idea maturity. Ideas are both positive statements sounding like a new thought aimed to describe or change the current state of the e-health development, and negative statements which may sound like a claim or criticism. The task of the idea management is encoded in the model for management of the e-health PSC.
- The e-health PSC **management model** is a set of actions which serving as the basis for the development, testing and implementation of an interactive internet interface within the platform.
- The **aim** of the e-health PSC management model is to provide a detailed scheme to connect, via mutual relations, the stakeholders' views with the multi-criteria e-health system elements by specifying the hierarchy of the evaluation criteria of the e-health as a system anticipating their peer-reviews and ensuring the feedback for system users.
- The e-health CP provides the following benefits for the e-health system:
  - Learning.
  - Knowledge sharing.
  - Network based on trust building.
  - Acceleration and knowledge co-production.
  - Idea collection.
  - Monitoring the progress.
- Testing of the e-health platform for stakeholder cooperation reveals the necessity of the e-platform.
  - During the experiment the stakeholders demonstrated that they are informed and have relevant knowledge on the development and problems of the e-health system; at the same time they indicated the importance of the information update. The experiment

showed that stakeholders were glad to be engaged and discuss the problems. Voting for the alternative proposals has also revealed the need for engagement and more active participation which could be treated as motivation to develop the e-health system.

- The verified e-platform benefits included:
    - Generation of multiple ideas; some of them were unexpected and could not be planned in advance
    - Ideas emerged from the periphery (the majority of respondents were administrators and doctors/nurses from the chain of intermediaries).
    - The opportunity to switch the roles (to assume not only the executor's role but also the role of an innovator or initiator).
    - IT-based collaboration systems shorten the remote social relations or establish the ties which in real life could never be developed. Since the e-health stakeholder CP is not yet operational, social relations are very rare and remote, and trust is very fragile. This was confirmed during the testing procedure. Regulators, i.e. the persons most remote from the experiment participants have been repeatedly identified as the ones at fault for e-health system interferences during all the phases. On the other hand, such a frequency of ideas shows that the community is ready for centralised solutions.
    - The experiment proved the occurrence of quite a number of theoretical tendencies in practice. For instance, it was confirmed that stakeholders are usually in favour of the top listed ideas. On the one hand, the first are the ideas reflecting the most painful element of the problem, and this element is usually well known. Other alternative ideas are usually related to part of the problem and are a constituent part of the solution; therefore stakeholders perceive them as secondary and don't bother to vote for them. On the other hand, the first ideas on the list require more concentration compared to the subsequent ones. Other ideas receive less effort, besides, psychologically we stop understanding the basic difference between the already analysed problems.

7.7. Political, organisational and management tools

The extensive research on stakeholder engagement demonstrated that in developing the e-health technological solutions in Lithuania quite a lot of expertise has been accumulated during this e-health development stage. The society is better informed on the use of technologies and is less afraid of new e-health solutions. Health professionals, managers, and even the patients are positive toward e-health solutions and support the new system. This quite positive context reveals the weakest e-health development chain – management, i.e. the ones in charge of stakeholder engagement. In order to solve these still urgent e-health development problems, the above management, political and administrative tools have been established. In fact, the above tools are just recommended trends rather than specific actions. Specific actions shall be identified by the institutions feeling capable of implementing them and having the delegated decision-making authority in cooperation with their stakeholders (by engaging them in the discussion on the selection of specific actions).

Political measures

1. The e-health centralised development. According to the research, the attitude of the Lithuanian community (health professionals) facing e-health development challenges is positive toward centralization of the e-health issues. The need for specialised and new competences has become a burden to every single healthcare institution. In view of this, a centralised problem-solving might be both, acceptable to the society and cost effective. Moreover, that centralised solutions already prevail in defining the e-health legislation or in developing the image exchange systems. Public management is subject to continuous changes from the centralised management to decentralisation; later a reverse process is observed since each solution has both, negative and positive consequences. A centralised e-health development can be subject to criticism for it can require major initial investment for the establishment of a new public management entity. It might also be difficult to abandon the existing institutional independence in making local e-health solutions. On the other hand, during this development phase individual solutions are too painful for the isolated healthcare institutions; this determined the uneven regional development and a number of financially unsuccessful development stages when the IT systems had to be replaced by the totally new ones. Another positive aspect would be related to the management of stakeholders. Their engagement could be more easily realised via the centralised e-health management.

Management tools

2. Management tools aimed to ensure patients' engagement:

In the healthcare system the patients still receive less attention from both, healthcare institutions developing their e-health elements, and from the institutions pursuing state regulation functions. The patient is the most vulnerable user of the healthcare system, however, the patient is most physically remote from all the e-health development phases although the patient's role in the strategic/political documents is defined in a declarative manner.

Realisation of the patient engagement is a complicated and costly process. Therefore, in order to increase the interest of patients in the e-health problems and retain them for a longer time, it is necessary to have effective and targeted tools and, most importantly, long-term performance measures. In view of this, the following performance trends have been specified:

- **To allocate the funds for patient engagement and for the e-health initiatives.** So far the efforts of the majority of stakeholders have been supported by reimbursing their engagement and by compensating their time/efforts for the development of the e-health elements. This was usually done via tendering procedures and funding of the e-health development projects. For instance, the EU structural support is granted pursuant to the priorities set by the healthcare institutions; they purchase IT and other services following the existing practice. This is the way to pay for the efforts of the ones who invest their time and intellect (heads of healthcare institutions, managers, doctors practitioners or IT specialists). However, the patients were not included in this list as if they could engage without compensation. Unfortunately, the appropriate practice is not in place and patients are not engaged in these processes. Therefore, if it is acknowledged that patients' contribution could be equalled to other stakeholder efforts, the patient engagement costs should be reimbursed adequately. The patients are one of the most complex groups of stakeholders. Thus their engagement could be encouraged by granting a budgetary allowance (especially at the beginning of the process) rather than calculating the patients' contribution.

- **To strengthen the associated structures of patients by increasing their engagement in the improvement of the quality of public services.**
  Patients are active in joining various associations; unfortunately, they are not always equipped with relevant management skills and hardly show the initiative when engaged in the political decision-making, especially when the content under discussion is complicated or is outside the patients' interest remits. The e-health content is exactly like that. Therefore, it is important to promote the association mergers via both, direct (via knowledge and funding) and indirect support (information on the situation), to recognise their activity and avoid discrimination of the associations which are not yet ready for effective performance, and motivate patient organisations to be active by applying standard procedures.

2. Management measures to retain the balance of interests

- **To compete with the companies providing non-IT services and engage research representatives in the e-health development.** Currently, the e-health development projects are implemented by few IT companies; acting in a limited market these companies seek to reduce the competition by establishing consortiums. The companies pursuing counselling activities have found their place in this market as intermediaries, i.e. the companies not equipped with IT skills and not providing IT services. Competition in the area of counselling is minor (only two companies), and this raise doubts concerning viability, transparency and even quality of work. If the funders decide that external management tools are necessary for the e-health development, they must either ensure fair competition or, if this competition is not natural, propose development of such services to the research sector thus ensuring engagement of one more group of stakeholders in the joint action.
- **To retain doctor patients relationship.**
  According to the research, the patient is isolated from other e-health stakeholders; however this isolation is not complete. The patient is in

close relationship with the doctor. The doctor is still (although less) isolated in the e-health development phases; it is believed that a big number of doctors prevents from engaging them in the process. In this two-dimensional dependence, the doctor is a very important chain for patients' engagement. The doctor is the first to hear the patient's desires, expectations, the increasing dissatisfaction/ satisfaction. Therefore, better doctors' engagement could ensure dissemination of patients' needs.

Organisational measures

Organisational measures face major implementation challenges for they often require specific and long-term financial resources for the establishment of organisations or their units.

3. To develop the measures for interactive stakeholder engagement.

- **To develop the feedback mechanisms with stakeholders.** The stakeholders are willing to engage in the e-health development processes when they feel (besides other major engagement factors, e.g. personal interest) that their activity is meaningful and mutually beneficial. Usually, this is ensured via feedback, i.e. the stakeholders are informed of the achieved results and on the discussions held in other environments. Even the ones who are not engaged can see the engagement results. The feedback can be ensured via the measures increasing transparency: documentation of meetings, evaluation of achievements, response to proposals, etc.
- **To implement interactive participation mechanisms.** Interactivity is one of the feedback forms aimed at increasing the stakeholder engagement when participants themselves can manage communication and its content. This could also be related to the information submission forms and reports on the analysis of the ongoing processes. Thus, interactive participation mechanism implies the measures which allow the participants to model independently relevant information without the intermediaries.
- **To create and implement the e-health platform for stakeholder cooperation.** All management measures are integrated via the IT-based e-health platform for stakeholder cooperation considering the problems related to better engagement and better integrity of the stakeholders, and ensuring the feedback (via interactive com-

munication). Such a platform can be developed by the initiative of both, the national authorities, and any other stakeholder. In fact, no affiliation to any group of interests would be the most effective since this will provide equal access to all interest groups (without real or virtual suppression of interests.

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CONCLUSIONS

1. Compared to the analysis made by the Ministry of Health of the Republic of Lithuania in 2011, the national e-health development is showing a positive trend. While, in 2011, only a quarter of all surveyed institution had e-health systems, our study demonstrated that at present, 67 per cent of professionals working at healthcare institution use e-health information systems on a daily basis. Such rapid development shows that this strategic policy are is bringing results. The period for the national e-health system and e-health project development of 2005–2009 (stages NESS-1 and NESS-2) was complex due to legal, technical and staff management issues and shortcomings in process regulation. These failures had an effect on the new stage of e-health development in Lithuania, which adopted the new functional, hardware and software architecture model of the Lithuanian e-health system and started developing ESPBI IS. The second stage stands out by a rather active implementation of the Programme on the Development of eHealth System of the Republic of Lithuania for 2009–2015 as well as most important national and regional e-health development projects as well as attempts to engage stakeholders.
2. According to international experience, there are two main approaches emerging in countries with more developed e-health systems: the Welsh approach (for instance, Denmark, the Netherlands, Finland and New Zealand) and the traditional English approach. There is a growing body of evidence demonstrating that stakeholder engagement can increase project success in terms of project management and management of organisational changes or development of technologies. Stakeholder engagement contributes to communication, acceptability and trust in relation to changes as well as their success and ensures improvement on the scale of the entire organisation.
3. On the scale of the EU, legal regulation of e-health exists but is still considered at an initial stage. Although strategic EU documents anticipate certain directions, this legislation is not binding. Directive 2011/24/EU on patient rights only initiates the certain process in the field of e-

health (design of guidelines, etc.). However, so far it does not provide any principles of operation of regional e-health systems and does not ensure the practical operation of such system as of the specified date. E-health legal framework in the EU Member States is currently undergoing rapid development; still, numerous disparities exist and the lack of uniform policy as well as strategy is evident. In addition, different electronic health record models are used. Numerous differences exist in regulation pertaining to patient consent on management of data for health purposes. Besides, national legal norms of investigated countries do not regulate interoperability of national e-health systems with those deployed in the other Member States. Processes of e-health legal regulation are gaining pace in other non-EU countries as well. It should be noted that, first of all, the legal regulation is introduced starting from the fundamental rules of law and later – by statutory instruments. However, there are many noticeable differences in e-health regulation that emerge from a comparison of these countries among them or with the European Member States (different regulatory instruments, etc.).

4. Lithuania has a number of valid documents: the eHealth Development Strategy, the Programme on the Development of eHealth System and the Action Plan of the Programme on the Development of eHealth System. However, all these documents provide goals and measures for up to 2015. Legal regulation on e-health in Lithuania should be revisited and improved, especially at the fundamental level (regulating the institution of electronic health record/electronic health history as well as modifying the Law of the Republic of Lithuania on the Rights of Patients and Compensation for the Damage to Their Health).
5. Active e-health stakeholders are healthcare professionals (physicians, nurses, IT specialists, laboratory and other specialists), patients, health and IT policy makers and implementing entities, employees of IT companies. The role of a central node in a social network (the highest degree of centricity and cooperation) is usually undertaken by hospitals and outpatient clinics that implement projects as they become the owners of e-health products and have the best method to collect information about relevant e-health needs.

6. The social network analysis unveiled a new phenomenon, i.e. participation of consulting companies is a new phenomenon in the implementation of e-health projects in 2007–2013. One central network player is the consulting company that plays a mediators' role which seems to help communicate for those who don't see eye to eye. At the same time, this leads to additional risks – the likelihood of a rather long interest representation chain, which moves authentic interests further away from the stake expression arena thereby also distorting the balance of stakes.
7. In the current period, the following e-health services are mostly developed in Lithuania: online patient appointment reservation, completion of medical statements, online tracking of patient insurance and enrolment, online filling of the statistical form of outpatient accounting (currently, 025/a-LK-form).
8. Significant inequalities exist in the overall development of e-health services as well as their accessibility and use among medical professionals and residents. E-health services are most accessible in Vilnius and other large cities and the least – in villages and small private healthcare institutions.
9. Only a small number of healthcare professionals believe that Lithuania has a sufficient range of e-health information systems. Usually, managers, specialists, and residents mention three services that are still missing: e-prescriptions, electronic health record, and online patient appointment reservation.
10. Awareness of e-health services among residents is poor. Among the main reasons why users are insufficiently informed, tend to underuse e-health systems and feel dissatisfied with the e-health deployment process is the availability of e-health system and stakeholder engagement in the decision-making and the development of e-health services aiming to ensure their acceptability to users.
11. Although medical professionals perceive innovations in a more positive light, there is still a greater portion of the group that have a negative opinion regarding the actual process of e-health deployment and its extent. Numerous challenges and obstacles related to the deployment of e-health are indicated. If residents with a negative view of e-

health systems usually indicate that such services are insufficient or completely inexistent and complain about the lack of information regarding e-health services, medical professionals indicate that most of negativity is related to the deployment processes rather than e-health solution. Along with problems related to financing (only one-third of surveyed institutions received EU Structural Funds), shortage of human resources (especially in small and rural healthcare institutions) and regulatory problems, issues related to deployment of innovations in management of processes became apparent, e.g. employee resistance to change, when certain groups of workers (especially, the elderly) avoid using new systems.

12. Patients are almost completely ignored in the process of e-health development and deployment. Their role is mostly theoretical, based on knowing that they seem to be important for product development; however, no real efforts are made to make this practice operational.
13. The result of the qualitative survey shows a shift in the attitude towards various e-health participants and their roles. Increasingly more attention is given to the need to exchange knowledge and experience, and consideration of each other's needs and expectations. However, it is not always clear, who of e-health participants – medical professionals or patients – are end users and should receive most benefits. Therefore, it is possible that the most important actors are insufficiently engaged in IS designed and in failure to implement important elements.
14. The Ministry of Health has too many functions in the field of e-health while too few of them are entrusted to healthcare institutions. This can be partly explained by the novelty of the e-health and evaluation of errors made during the first stage of the system's development when processes of e-health development lacked leadership and coordination of the Ministry. However, currently, there is a lack of bolder leadership among healthcare institutions in assuming functions of decision-makers. Still, a trend is observed that despite the state of the knowledge cycle, e-health participants would want to have a strong coordinating party at each stage. They seem to entrust these functions to the Ministry of Health, hoping this way also to transfer the responsibility for decisions related to funding as well as the quality of the end result.

However, scientific studies on the distribution of roles and functions demonstrate that in case of a strong coordinating party, the quality of undertaken activities tends to suffer. This usually happens due to reduced creativity and initiative of a working group. Meanwhile, a more user-friendly and, therefore, more acceptable e-health product that would better answer the needs of future users could be achieved by entrusting the coordinating role of specialists (e.g. medical professionals of healthcare institutions). Transfer of the leadership role to a healthcare institution would not mean the complete resolution of problems because of the weight is given to IT companies as product developers on the one hand or ignorance and isolation on the other. Consequently, the role of IT companies as decision-makers is only possible in one knowledge management phase, while, in others, their input is placed somewhere between the roles of an implementer and observer. Interview results demonstrate a positive trend: the Ministry of Health is not attempting to gain the role of the universal coordinator. On the contrary, they initiate the search for creativity and innovation themselves, transferring the initiative and responsibility to a healthcare institution. The Platform would help to resolve such problems.

15. The e-Health Platform for Stakeholder Cooperation was developed on the basis of the hierarchy of innovations in the health system and healthcare management (people-centred, enabling strategies for health promotion, integrated healthcare and teamwork) and the interplay of management theories. In the model, knowledge management describes aims of the developed platform (to accumulate and analyse knowledge); management of collective intelligence defines the purpose of the e-Health Platform for Cooperation (to create interaction between stakeholders aimed at new quality of collective knowledge); management of stakeholders determines users of the d-Health Platform (who are e-health stakeholders and how to recognise them); the group role theory helps to recognise the mechanics behind stakeholder cooperation and related barriers.
16. The design of the model promoting stakeholder engagement and participation is dedicated to the description of necessary managerial conditions and links between them, which determine support

to stakeholder engagement and participation in the development of best e-health system solutions. Structurally, the model is based on five elements: participants, a set of roles required for cooperation (CR), measures for collective intelligence management (MM), knowledge management process (KMP), and their interaction. The above-mentioned model unveils a tri-fold nature of participation. Effectiveness of the knowledge management process and interaction E(KMP+I) is a dynamic function that depends on measures of collective intelligence management (MM), completeness of stakeholder set, role manifestation quality (CR) and effectiveness of interaction: E(KMP+I) = f(MM, CR, I).

17. The model of the eHealth Platform for Stakeholder Cooperation (PSC) is based on the lifecycle of ideas, in which the main object under management is an idea, which survives all knowledge management cycles from accumulation to gestation of ideas. Despite the rather complex theoretical model, the platform available in the electronic space is very simple and user-friendly (http://ehealth.lt).
18. The e-Health Platform for Cooperation ensures the following benefits for the e-health system: learning, knowledge sharing through participation, trust-based development of networks, promotion and design of the knowledge process, and generation and accumulation of ideas.
19. Testing of the e-Health Platform for Stakeholder Cooperation revealed an apparent need for the Platform. During the pilot, stakeholders not only demonstrated being in possession of knowledge and information regarding the development of the e-health system and related issues but also unveiled the need to update information. The pilot showed satisfaction of participants that resulted from the facilitation of engagement and discussions. Voting for alternative proposals also reflected the need for engagement and greater participation, which can be interpreted as motivation to development the e-health system.
20. Applying the designed model in the continuous process through health management innovations and possibilities offered by social technologies, and effecting the interplay of management theories, problems generated in the e-Health Platform for Stakeholder Cooperation and suggested solutions produce a dynamic set of political, organisational

and managerial measures that are constant and self-updating in current time, which is valuable for decision-making in e-health development. Consequently, as an innovative instrument of social technologies the designed Platform automatically provides and updates political, organisational and managerial measures in real time.

ANNEX 1:
Plan/Methodology for Testing Cooperation among eHealth Stakeholders

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STAGE 1

Voting on relevance of the most frequent e-health problems

Instructions: Individual work. Each statement should be rated separately. Statements collected from respondents should be submitted for voting; consequently, they can be subjective and have an emotional undertone.

Demographic information:

Age
Gender
Position (physician/ nurse/ employee of IT company/ politician/ patient)

List of problems

	Area managed	**Description of a problem**	**Voting score (pleas, circle)** **1 (hardly relevant)** **5 (very relevant)**
1.	Human resources: IT literacy and other competencies	The intense resistance of employees to innovations impedes the **development** of e-health.	1-2-3-4-5
2.		Poor distribution of functions during e-health design and deployment.	1-2-3-4-5
3.		Flawed e-health system results in dissatisfaction of medical staff.	1-2-3-4-5

	Area managed	**Description of a problem**	**Voting score (pleas, circle)** **1 (hardly relevant)** **5 (very relevant)**
4.		Poor literacy of medical staff and resistance to innovations impedes the **deployment** of e-health.	1-2-3-4-5
5.		Poor understanding of possible e-health IT solutions in all chains (managers, physicians, nurses).	1-2-3-4-5
6.		The intense workload of medical staff impedes e-health deployment.	1-2-3-4-5
7.	Organisational structure	E-health systems recommend changing the management of healthcare institution, yet old methods persist.	1-2-3-4-5
8.		Current managerial principles of healthcare institutions object to the logic of IT solutions.	1-2-3-4-5
9.	Management	Poor interest of managers in a choice of a specific e-health solution.	1-2-3-4-5
10.		Poor interest of managers in the course of implementation of a specific e-health solution.	1-2-3-4-5
11.	Attributes of an e-health solution	In the content of the e-health platform, the most important thing is relationships rather than the form.	1-2-3-4-5
12.		It is unclear, what e-health solutions should look like, which impedes the smoothness of all stages of the process.	1-2-3-4-5
13.	Finances, management	Failure to communicate with IT companies results in increased e-health costs.	1-2-3-4-5
14.		Lack of funding.	1-2-3-4-5
15.		Lack of centralised coordination	1-2-3-4-5

	Area managed	**Description of a problem**	**Voting score (pleas, circle)** **1 (hardly relevant)** **5 (very relevant)**
16.	Infrastructure	The only obstacle on the way to e-health success is the lack of IT equipment in a healthcare institution.	1-2-3-4-5
17.		The transition stage with used old records (paper-based system) and e-health system, which makes daily life harder and is ineffective.	1-2-3-4-5
18.	Regulation	State institutions are late with the design of the e-health model.	1-2-3-4-5
19.		State institutions are insufficiently concerned with the provision of required funding.	1-2-3-4-5
20.		E-health regulation is excessively complicated and coordination of new systems with the Ministry of Health are lengthy.	1-2-3-4-5
21.		Incompatibility of local e-health systems is the result of poor regulation and planning.	1-2-3-4-5
22.		Public procurement impedes the design of the best possible e-health system.	1-2-3-4-5
23.	Role of IT companies	IT companies are trying to choose the easiest path and offer products off the shelf; however, such products do not respond to the needs of healthcare institutions.	1-2-3-4-5

If the relevant problem is not listed above, please provide your own.

		Description of a problem	1-2-3-4-5

STAGE 2

Solution to a selected e-health problem

Instructions: The exercise is given 30 minutes. Group work in most likely stakeholder groups.

Demographic information

Stakeholders

Number of group members

Please, provide alternative solutions to the problem

	Role of IT companies	IT companies avoid responsibility and, therefore, act with extra care.

Alternative 1 ....

Alternative 2 ....

Alternative 3 ....

Alternative 4 ....

Alternative 5 ....

STAGE 2

Solution to a selected e-health problem

Instructions: The exercise is given 30 minutes. Group work in most likely stakeholder groups.

Demographic information
Stakeholders
Number of group members

Please, provide alternative solutions to the problem

9	Organisational structure	The new form of management and deployment of new organisational structure suggested by the e-health system are late; the work continues just as before the installation of the e-health solution.

Alternative 1 ....

Alternative 2 ....

Alternative 3 ....

Alternative 4 ....

Alternative 5 ....

STAGE 2

Solution to a selected e-health problem

Instructions: The exercise is given 30 minutes. Group work in most likely stakeholder groups.

Demographic information

Stakeholders

Number of group members

Please, provide alternative solutions to the problem

	Poor understanding of possible e-health IT solutions in all chains (managers, physicians, nurses).

Alternative 1 ....

Alternative 2 ....

Alternative 3 ....

Alternative 4 ....

Alternative 5 ....

STAGE 3

Evaluation-by-voting of alternatives formulated during Stage 2

Instructions: 20 minutes are given to voting. Voting should be done individually.

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