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# The Development of eHealth in an Enlarged EU

# SYNTHESIS REPORT

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## PREFACE

The present report has been prepared as part of a wider project that studies the development of eServices in the New Member States.

### *Policy context*

At the European Council held in Lisbon in March 2000, EU15 Heads of Government set a goal for Europe to *become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion.* The renewed Lisbon goals of 2005 emphasize working for growth and jobs, and include plans to facilitate innovation through the take-up of Information and Communication Technologies (ICT) and higher investment in human capital.[1]

ICT, and related policies, play a key role in achieving the goals of the Lisbon strategy. In 2005, the new strategic framework for Information Society policy - i2010[2] - identified three policy priorities: the completion of a single European information space; strengthening innovation and investment in ICT research; and achieving an inclusive European Information Society.

All three priorities, and especially the last one, consider public services to be a key field for the application of ICT, because of the impact that ICT-enabled public services could have on economic growth, inclusion, and quality of life. Within this framework, policy actions have been taken in fields such as e-government[3] and e-health.[4] Public services have also been included as application fields for ICT in the 7th Framework Programme for Research and Development[5] and in the ICT Policy Support Programme of the Competitiveness and Innovation Programme (CIP).[6]

### *Research context*

IPTS[7] has been researching IS developments in acceding countries[8] since 2002.[9] The outcomes of this prospective research, which aimed to identify the factors influencing Information Society developments in these countries and the impacts these developments have on society and the economy, point to the need for better understanding the specific contexts in each member state for the take-up of e-applications, in particular eGovernment, eHealth, and eLearning. These key application areas have an impact not only on the relevant economic and public service areas but also on the development of the knowledge society as a whole. The European Commission has been supporting research activities in ICT for Health for the last two decades.

Taking the above into account, IPTS launched a project with a consortium led by ICEG EC in 2005 to study the three application areas in the ten New Member States[10] that joined the European Union in 2004, in order to build up a picture of their current status and developments in the field, the most important opportunities and challenges they face, the lessons other member states may learn from them, and the related policy options. National experts from each country gathered the relevant qualitative and quantitative data for analysis, in order to develop a meaningful assessment of each

1 http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm
2 "i2010 – A European Information Society for growth and employment" COM(2005) 229
3 "I2010 eGovernment Action plan" COM(2006) 173
4 "e-Health - making healthcare better for European citizens" COM (2004) 356
5 See http://cordis.europa.eu/fp7/ict/ and Official Journal L 412 of 30/12/2006
6 Official Journal L 310/15 of 9/11/2006
7 Institute for Prospective Technological Studies, one of the seven research institutes that make up the Joint Research Centre of the European Commission
8 Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia, and Turkey
9 For a list of complete projects and related reports see http://fiste.jrc.es/enlargement.htm
10 Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovenia and Slovakia

country's current state, and trajectory, and to find out the main factors. This allowed them to derive the relevant conclusions in terms of policy and research.

The IPTS team designed the framework structure for the research, the research questions and methodology. This team and the consortium coordinator jointly guided the national experts in their work through workshops, extended reviews and editing of the various interim reports. Data sources such as international and national survey data, literature, policy documents, and expert interviews were used to capture the most recent situation of each country.

In addition to national monographs describing eGoverment, eHealth and eLearning developments in each country, the project has delivered three synthesis reports, based on the country reports, which offers an integrated view of the developments of each application domain in the New Member States. Finally, a prospective report looking across and beyond the development of the three chosen domains was developed to summarize policy challenges and options for the development of the Information Society towards the goals of Lisbon and i2010.

This report presents the synthesised results of the research on eHealth in the ten New Member States. First, it describes European eHealth priorities, the health systems in these 10 countries and the role played by eHealth within these systems. Then, the major technical, economic, political, ethical and socio-cultural factors of eHealth developments, as well as the major drivers and barriers are assessed. These provide the basis for the identification and discussion of policy options to address the major challenges and to suggest R&D issues for facing the needs of these countries. The report reflects the views of the authors and does not necessarily reflect the opinion of the European Commission. Its content has been peer reviewed by national experts, ICEG EC, and IPTS.

In this study, eHealth is defined as the use of modern information and communication technologies (ICTs) to meet the needs of citizens, patients, healthcare professionals, healthcare providers, and policy makers. It makes use of digital data, transmitted, stored and retrieved electronically, for clinical, educational and administrative purposes, both at local sites and at a distance from them. Hence the study looks into the use of ICT in public health policy and for the prevention of disease, information services to citizens, integrated patient management and patient health records, and telecare and independent living services applications.

From February 2008, all reports can be found on the IPTS website at: http://www.jrc.es/

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| CY,CZ,EE,HU,LV, LT,MT,PL, SK,SI | Country abbreviations for Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia |
| EHIC | Electronic European Health Insurance Cards |
| EHIF | Estonian Health Insurance Fund |
| EHRs | Electronic Health Records |
| EU | European Union |
| EU10 | The member states joining the European Union on 1, May, 2004. |
| EU15 | The member states of the European Union before 1 May, 2004. |
| EU-8 | The member states joining the European Union on 1, May, 2004, except for Cyprus and Malta |
| EUR | euro |
| GDP | Gross Domestic Product |
| HEFOP | Human Eroforras OP, Human Resources Operative Program (Hungary) |
| HUF | Hungarian Forint |
| ICT | Information and Communication Technologies |
| IDABC | Interoperable Delivery of European eGovernment Services to public Administrations, Businesses and Citizens |
| IT | Information Technology |
| NGO | Non Governmental Organisation |
| NHIS | National Health Information System |
| NMS | New Member States, see EU10. |
| PC | Personal Computer |
| PHARE | Pologne-Hongrie Aid a la Reconstruction Économique, the European Union's financial and technical cooperation programme with the countries of Central and Eastern Europe before the accession |
| PIAP | Public Internet Access Points |
| PPP | Public Private Partnership |
| PPS | Purchasing Power Standards |
| R&D | Research and Development |
| RFP | Request for Proposal |
| SME | Small and Medium Sized Enterprises |

# EXECUTIVE SUMMARY

## Context

This report synthesises the results of the national studies prepared within the project "Next Steps in developing Information Society Services in the New Member States: the Cases of eGovernment and eHealth". The report gives a comparative assessment of eHealth policies and institutions, challenges and achievements in the EU10. It also gives examples of best practices in eHealth, analyses the possible policy options at local, regional, national and European levels and highlights the most important future technical and non-technical R&D challenges specific to eHealth.

It is important to note that New Member States are not a homogenous group. Differences among EU10 countries are as great as their differences with the EU15.[11] Some New Member States, such as Estonia and Slovenia, have long and strong traditions in ICT and eServices. This is related to a major difference between small and large countries - the former are more able to reform, innovate and absorb technological opportunities.

### Challenges to the healthcare system

The New Member States have some specific health and healthcare sector problems, which are also important factors for eHealth developments in these countries. In the EU10, average life expectancy is below the EU15 average: by 1-4 years in Slovenia, the Czech Republic and the two island countries, and by almost 6-11 years in the Baltic States and Hungary.

The population in the EU10 countries is declining or remains unchanged, with the exception of Cyprus, Malta and Slovenia. Birth rates are below the EU15 average and death rates are higher. There are various factors behind the higher death rates, which, in the EU10, exceed the EU15 level by 25%. One of them is the above-average incidence of certain causes of death, such as cardiovascular diseases, cancer and neuropsychiatric disorders. The mortality rate of the middle-aged male population is 2.5 times higher in the EU10 than it is in the EU15. Besides the high mortality and the low fertility rate, emigration (as net migration had a positive balance in 2006 only in Hungary and Slovenia) is another factor in the decline of the population.

The demographic situation in the EU10 is also different from that of the EU15, as the percentage of people belonging to the younger generation and the older generation is 2% higher, and 2% lower respectively. However, the share of population over 65 has grown faster in the recent decade in the EU10 than in the EU15. Health sector developments in the EU10 are increasingly influenced by population ageing, which began later than in the EU15.

The EU10 countries spend a lower proportion of their GDP on healthcare. There has been a drastic decline in healthcare expenditure in the EU10 during the structural, and institutional changes of the 1990s, though this has gradually recovered in recent years. However, the average level of healthcare expenditures to GDP was 9.4 % in the EU15 in 2004, whereas it was only 6.83 % in the EU10. The gaps are even more striking between the two country groups in per capita terms: the adjusted per capita healthcare spending was 1.891 Euro in the EU15, while it was only one third of that, 624 Euro, in the EU10.

As a result of the pressures stemming from financial sustainability, cost explosion, worsening health service quality and major health status indicators, most of the EU10 have initiated reforms in their health sectors. While the scope, elements and outcome of the reforms have been country specific, there were some common elements. Healthcare reforms in many countries have been directed at long-term structural issues, including the ways of financing healthcare and determining the role of the private sector. The financing models for health services in New Member States are institution-centred, supporting bigger providers, which leads to higher numbers of hospital beds per inhabitants (780 beds per 100,000 inhabitants) than in the EU15 (600). The healthcare insurance system has country-specific

[11] Comparing the average of EU10 versus EU15 is not very meaningful as it hides very important differences. The weighted averages are heavily influenced by the data of Poland, which alone makes up more population than all the other countries together.

features in the EU10, which include countries with one or multiple insurance companies, with local or foreign-owned insurance providers, among others.

The number of primary-care doctors and nurses is lower in the EU10 than in EU15 and the only exception is specialised doctors. Migration of healthcare professionals has also become a challenge for some countries.[12] A general problem, which might be causing migration of healthcare professionals is their relatively low formal wage level.

**eHealth developments**

ICT penetration is one of the key elements of eServices development. The share of households with Internet connection was 37% in the EU10 in 2006, and 53% in the EU15. Only Slovenia, Malta and Estonia approach the EU15 average level and other countries lag behind, with less than 20% of households with Internet connection at home. Despite of lower household connection rates, Internet usage has increased rapidly, as it incorporates Public Internet Access Points (PIAPs) and usage from other locations as from work. Broadband access in the EU10 has increased considerably in recent years, especially in 2005, when the share of households with broadband connection more than doubled from 7% to 15%. Estonia has outperformed most of the EU15, as almost 30% of the households connected to the Internet gained access to broadband. Access and diffusion of ICT is no longer a universal and primary barrier, but it still remains a constraint for remote areas, less developed regions, and socially disadvantaged user groups.

For the provision and usage of eHealth services, comparable statistical information is rare. If the social security contribution for employees is chosen as an illustrative example of public eHealth service, this is an available online service in all countries, but it is fully transactional only in 4 of the New Member States. A similar service is also available online for individuals. For example, an unemployment benefit service is offered online in all countries, but the online sophistication level of this service is lower than it is in the business sector. It allows only one-way interaction in 7 countries and only online information is given in the other 3 countries.

If "health-related information search" is chosen as an indicator of eHealth usage, the user group has increased from 9.4% in 2005 to 14.3% among Internet users in the EU10 in one year. The growth is not only due to the improvement of health information on the Internet, but is also related to the increase of Internet penetration and usage in the EU10.

While the growth in the number of individuals seeking health information has accelerated, the scope of eHealth services used is still limited. For example, only 1% of Internet users make their appointment online or request online medical advice, but 14.3% of the users look for health related information. This, however, is not a phenomenon specific to the EU10 - the usage level of Internet for making an appointment with a practitioner is 0.6 % for the EU15 countries, even lower than in EU10. The online availability and sophistication level of the "health insurance service", as another example of eHealth, also varies from country to country, and within the same country. For example, in the Czech Republic, the communication between the nine health insurers and the providers is electronic and some of the insurance companies also offer services to clients such as downloadable forms and statements of claims through their portals.

The creation of integrated national health information systems is planned by nearly all countries, but only a few have implemented it already. The Czech Republic introduced UZIS (www.uzis.cz), a portal with mainly statistics and information on healthcare providers. Hungary has these services but they are still fragmented, while Cyprus plans to develop an Integrated Healthcare Information Support (HCIS) System, which would integrate with other systems and institutions from both the government and non-government sectors.

[12] For example, according to the Supreme Medical Chamber of Poland, one of the main problems of the healthcare sector was the emigration of medical staff to other EU countries after the EU enlargement (in Poland, some 5,000 left and a further 25,000 - 30,000 are expected to leave the country in the near future). According to the Polish Country Report, the situation with regard to specialists appears to be even more dramatic. In some regions, 50% of haematologists have already left the country.

A common focus of national eHealth developments is the creation and launch of eHealth Cards, although the main aim and the level of sophistication achieved also varies among the countries. A common conclusion drawn by the country report authors is that the development level of eCards is in line with the European policy priorities, as the development of electronic health cards and records is one of the objectives defined in European eHealth Action Plan.

eHealth developments in the New Member States focus on services related to administration and setting up information bases and databases like eHealth portals. The provision of information to citizens and the management of patient health records have received significant support in recent years. For example, in Slovakia, the Ministry of Health has launched its eHealth portal, which combines different sources of information on institutions, laws and regulations, and description of diagnoses. It also offers citizens the opportunity to consult health problems with specialists and allows them to download forms for printing out.

On the other hand, there is very limited information available (and it is not comparable) about telemedicine or independent living services. One of the few telecare pilot projects in the New Member States was implemented in Lithuania - 'the Kaunas eHealth Cluster'. The DITIS project (Collaborative Virtual Medical Team for Home Healthcare for Cancer Patients) in Cyprus is a successful example of ICT-based independent living system. It is a web-based system, for medical teams and allows virtual collaboration for home healthcare for cancer patients.

**Funding**

Limited funding for eHealth development is a common conclusion of country reports. Most eHealth projects in the New Member States are financed publicly from state budgets. Private funding is more frequent for private medical actors, hospitals and commercially-oriented health-information websites. The private sector gives technical and maintenance services for hardware and software packages for all government bodies for eHealth services. The World Bank and the WHO have been important sources of funding for these countries' eHealth developments.[13] It has been noted that, for most of the New Member States, Structural Funds have not played a crucial role so far in eHealth developments, although many pilot projects were launched in 2004-2006. However, researchers point at the important financing opportunities that the 2007-2013 new structural funds program could bring.

PHARE projects have also had a strong influence in the EU10, where their implementation has meant setting standards, providing regulations and harmonisation with EU requirements.

**eHealth Policies and Strategies**

European strategies and best practices have, to a great extent, influenced the development of EU10 policies. This is also obvious from the names and years of adoption of specific strategies and Action Plans. For example, the Slovak eHealth Action Plan itself is based on assessment of the current state of eHealth and analysis of future trends especially in EU countries. Similarly, Lithuania has performed a detailed analysis of EU countries, and referred Denmark, UK, Greece, Switzerland, Italy and Sweden as useful models for eHealth strategy development.

Ministries of Health remain the focal points for planning the development of eHealth in EU10 (the exception is the Estonian Ministry of Social Affairs). In half of the EU10 (CY, CZ, HU, SI, SK), the Ministries of Health established different sub-bodies (sections, departments, committees and councils), which focus directly on eHealth development. In the EU10, the strategies, policies and relevant action plans regarding health are generally prepared by central government, which elaborates most of the health policies. Preparation of eHealth strategies has not followed this routine path and these documents have been prepared in close collaboration with professionals from the health and ICT fields. Only in Lithuania and Latvia, have all policy-making decisions been made solely within the

[13] For example, the Estonian National Health Informatisation System was co-financed by the World Bank. In Hungary, Hospital Management Information Support was also funded by the World Bank. The World Bank is recorded as being the biggest investor in eHealth in the Lithuania. In 1997, the Latvian Welfare Ministry created a "Healthcare Reform" plan and Latvia signed an agreement with the World Bank for a dedicated loan to implement a project which will form the foundation for eHealth development in the country.

Ministries of Health. The implementation of eHealth strategies and policies is trusted to many public institutions, including national centres, departments within ministries, agencies or insurance authorities.

Up until now (2007), Poland, the Czech Republic, Malta and Estonia are the only countries that have not yet officially adopted eHealth strategies. Most New Member States have reported that their strategies follow EU guidelines for eHealth development. In some countries, action plans were prepared simultaneously with their national strategy, (for instance the Slovak eHealth National Strategy (Road map) and the Slovak eHealth Action Plan, the Latvian eHealth Action Plan and the Hungarian Activity Plan of the eHealth Programme in the Hungarian Information Society Strategy), while in other countries, action plans are in preparation. However, there are some cases where eHealth projects are being developed independently and are not presented within eHealth action plans.

The business sector plays an active role in some areas of the implementation of eServices (equipment leasing, maintenance and operational support), while they rarely participate or have an important place in decision-making concerning eHealth development. An exception is Latvia, where a business service firm has been contracted by the Ministry of eHealth to produce an eHealth development strategy. There is a similar case in Poland but at regional level – a private association prepared the eHealth strategy 2007-2013 for the Lodz region.

The EU10 countries have reported that challenging issues arise around legislation for eHealth development. There is lack of compulsory legislation on the application of eServices, and there are difficulties with current legislation on patient databases, reimbursement laws, and standards legislation. Only Estonia and Poland report a favourable and supportive legislative environment for ICTs. The other countries report that their legal frameworks are incomplete, inefficiently implemented, and form a barrier for eServices development and implementation. Cyprus, Lithuania, Hungary and Malta, particularly, report gaps in legislation adoption.

## Key Policy Challenges for eHealth Development

The reform of the healthcare sector has been one of the main factors of eHealth development. These reforms include changes in the way healthcare services are financed, the institutional structures providing them, and the ownership of health service providers. In most countries, healthcare reforms have been initiated in order to modernise the sector to reduce treatment costs, and increase the effectiveness and productivity of healthcare. Another factor affecting eHealth developments has been the **increase in the quality and availability** of basic ICT infrastructure. Investment in ICT infrastructure and telecommunication-related regulatory improvements have resulted in a major increase in ICT usage and penetration indicators for the household, public and corporate sectors. The importance of making use of best practices for the development of eServices has been recognized by most of the EU10 policies.

In most of the EU10, coordination of eHealth policies and projects is reported as an important challenge for eHealth developments, which has led to **limited interoperability**. Coordination problems are accompanied by limited available funding. At the same time, policies have focused only on absorbing the EU Structural Funds, rather than on obtaining positive spillover effects. There have been no **impact assessment studies** of implemented eHealth solutions, which could lead to the repetition of similar mistakes.

A crucial policy challenge is to raise the **level of eHealth financing.** An important policy driver for eHealth could be the use of Structural Funds, as the EU10 will be the recipients of external investment funds, possibly equalling 4% of their GDP, which significantly exceeds the level of external development funding entering these countries between 2004 and 2006. Other challenges that should be addressed by policy makers are related to the **adaptation of the legal and regulatory environment**. Besides the policy-related challenges, there are also **research and development ones.** For example, developing appropriate indicators and procedures **to measure the usage and impact of eHealth is a research challenge for all New Member States.** Not only has there been a lack of impact assessment, but also cost-benefit analyses have been conducted rarely.

In order to ensure that it has a positive impact, eHealth should be an integral part of **healthcare policies**. The role of eHealth should be to foster or enable the achievement of certain healthcare goals, including universality, access to good quality care, equity and solidarity. Improving the digital literacy and eSkills of the population and medical staff is an important challenge for eHealth development. Within the more **eHealth-specific policy challenges,** several are applicable in all EU10 countries. These challenges include the finalisation and implementation of eHealth Roadmaps, the switch to more proactive government policies, and the implementation of legal measures or major eHealth projects.

## INTRODUCTION

This study is the Synthesis Report of the national studies prepared within the project "Next Steps in developing Information Society Services in the New Member States: the Cases of eGovernment and eHealth". Within the 15 month long research project, national experts[14] analysed the evolution of eGovernment and eHealth in the EU10 countries,[15] based on the collection of major statistical and factual information about the two domains.

The country studies prepared within the project were uniform, used common template describing all main aspects of eHealth. One main goal of the country studies was to collect the relevant qualitative and quantitative data on eGovernment and eHealth to provide a stock take on their level and to assess the major institutional, financial, policy, technological and legal aspects of their development. Second, based on this data collection, the country studies determined the major factors that affected the evolution of eGovernment and eHealth, the main underlying drivers and barriers, which influence their current trajectories and the short- to medium-term challenges faced by them, upon which the policy options and research and development challenges are discussed.

**eHealth** refers to the use of modern information and communication technologies (ICTs) to meet the needs of citizens, patients, healthcare professionals, healthcare providers, as well as policy makers. It makes thus the use of digital data, transmitted, stored and retrieved electronically, for clinical, educational and administrative purposes, both at the local site and at a distance.

eHealth may be divided to the following major application areas: a) public health policy and prevention, b) information services to citizens, c) integrated patient management and patient health records, d) telecare and independent living services.

The Synthesis Report meets three goals. The first is to **give a synthesised summary** of the ten country reports about the situation of eHealth in the New Member States. This includes among others a generic assessment of the past and current developments in eHealth across the ten countries, the identification of the major specific to eHealth technical, economic, political, ethical and socio-cultural (including skills and training) factors influencing these developments. By building on the country studies the Synthesis Report tries to illustrate the major differences and commonalities across analysed countries.

The second goal is to **analyse** the possible **eHealth policy options** at local, regional, national and/or European level in order to address the overall challenges and the local/global needs identified in the ten national reports to make progress in this Information Society service in each country.

The third goal of the Synthesis Report is to highlight the most important future **technical and non-technical R&D challenges** specific to eHealth, in order to address the challenges and the local/global needs identified in the ten national reports.

The Synthesis Report is not a mere summary of the national reports as it goes much beyond the findings of the national studies. First, it gives a comparative assessment of policies, institutions, financing, problems and progresses with eHealth in the individual countries, which as a summary allows comparing them with the existing institutions, policies in the EU15 and thus broadening the knowledge and the empirical evidence on eHealth in the European Union.

Second, it shows the best practices with eHealth developments allowing to draw generalised and broadly applicable conclusions for policy makers concerning the policy measures needed for accelerated development of eHealth.

[14] The list of country studies and of the national teams preparing them may be found in the Annex to this study.

[15] The last two rounds of enlargement increased the members of the European Union from 15 to 27. The May 2004 enlargement of the European Union resulted in the entry of Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia, while Bulgaria and Romania joined the European Union in January 2007. The project dealt with eHealth developments of the May 2004 entrant, therefore the synthesis report covers the experiences of these 10 countries (referring to them as EU10), leaving out of the analysis the other two new members.

Third, it has a European context, by providing the assessment of the implementation of the European rules, policies and priorities in eHealth by the NMS and also by providing lessons, experiences for the European Union from the good or bad experiences of these countries. The report shows how the special features of these countries can enrich the discussion and policy targets of eHealth in the EU25, while it also presents how the policies, legislative decisions of the European Union influence policies in NMS.

Finally, the lessons and issues of eHealth in the NMS may have implications for research on this domain going beyond the policy issues relevant for the European Union. The analysis thus touches upon such priority issues as technological aspects of eHealth, institutional changes in the healthcare sector, generally the employment effects of the more intensive application of eHealth, where conclusions may be relevant also beyond the European Union.

Based on these principles, the Synthesis Report is structured as follows. The first chapter serves as a background to the main issues described later: it presents the European policies on eHealth, the health sector characteristics and the current picture on eHealth related ICT features of the EU10. By focusing on health sector and eHealth related policies of the European Commission, this chapter presents European policies to provide the background for evaluating them in the EU10. The detailed description of healthcare sector in the EU10 highlights the institutional framework, the major policy issues and challenges and those health services that may be important for eHealth.

The next chapter presents eHealth level in the EU10. It begins with a comparative assessment of statistical facts on eHealth, continued by an assessment of major policies and strategies and their contribution to IS developments. Finally, based on the 10 national studies, the chapter determines the major achievements and shortcomings of eHealth.

The third chapter describes the past factors of evolution, and the current drivers and barriers of eHealth. It begins with the presentation of cross-country main factors affecting the evolution of eHealth: the description closely follows the approach adopted in the ten national studies focusing on the similarities among the ten countries. Based on these factors, the assessment of drivers and barriers focuses on the general dynamics of information society take-up, the policy approach, financing framework of eHealth services and on the institutional, regulatory, security aspects.

The final chapter begins with the description of main policy, technology, financing, regulatory and institutional, usage challenges facing eHealth in EU10. Then it presents the most important future technical and non-technical R&D challenges specific to eHealth. Afterwards it assesses the general lessons learnt from the Synthesis Report and the ten national studies and derives those conclusions that may be relevant for European wide developments from the experiences of EU10. Finally, the study concludes with an overview of selected main policy options available for policy makers.

# I. EUROPEAN E-HEALTH PRIORITIES AND THE HEALTHCARE SECTOR IN THE EU10

eHealth may be characterised as the tools that can facilitate the processing, sharing and transfer of information and data across the whole spectrum of citizen, patient, health professional and health administration relationships and interactions. The key factor about eHealth is that it facilitates the interactions not only between diverse parties, but also between the types of information. e-Health tools support the aggregation, analysis and storage of clinical data in all its forms; information tools provide access to the latest findings; while communication tools enable collaboration among many different organisations and health professionals.

Among the major information users in eHealth the healthcare administrators, the healthcare professionals and the patients are the key stakeholders. The use of eHealth applications allows healthcare administrators to facilitate appointment and bed booking, coding, tracking and schedules as well as billing and record keeping on their patients. For healthcare professionals eHealth allows the access to up-to-date and timely patient information (patient tracking, clinical imaging and lab oratory results), to information essential for their practice (including drug information, clinical guidelines, decision aids, patient education, electronic prescribing), to determination of patients rights (through the identification, accreditation, access rights) and finally also for a more professional education and research. Finally, for patients eHealth means better and sustainable treatment (lifetime secure medical record, monitoring, advice, home and distance care). It also allows the patients to be involved actively in decisions related to their own health, rather than simply accepting the considerable discrepancy ('asymmetry') in knowledge between themselves and health professionals.

As a result of information sharing and better access to vital information, eHealth systems and services can reduce costs and improve productivity in such areas as i) billing and record-keeping, ii) reduction in medical error, iii) alleviation of unnecessary care, and iv) business-to-business e-commerce.

The information provided with the help of eHealth (through the net, electronic health cards (EHC), portable devices on patients, billing and other) can benefit not only health professionals but all the staff employed in the health sector including nursing, care, and administrative staff.[16] Furthermore, e-Health can contribute to achieving a safer working environment for health practitioners.[17] By 2010, e-Health spending may account for up to 5% of the total health budget of the 25 Member States from just 1% in 2000 (for 15 Member States)

## I.1. European policies and priorities for eHealth developments

As emphasised by various European key policy documents, the health systems of the European Union are a "fundamental part of Europe's social infrastructure." Therefore the goals and priorities of Member States in the field of healthcare are quite similar and include among others universality, access to good quality care, equity, and solidarity, all of which constitute a set of overarching values that are shared across Europe. While the institutional structure of healthcare systems, the division of responsibilities and financing is a country specific issue, most of EU health systems aim at ensuring healthcare provision, which is characterised by patient-centred approach and responsiveness to individual needs. Considering the main challenges faced by the healthcare sectors, the Member States aim at making their systems financially sustainable, while safeguarding common European values. An integral part of this strategy of sustainability is a shift in focus towards preventive measures, which is seen as a possibility to reduce the cost burden by avoiding the occurrence of disease and associated treatment costs.

In order to meet these goals and challenges more effectively, eHealth is envisioned as providing a central means of enabling a more collaborative and coherent healthcare provision.

[16] In 2002, this was 17.5 million persons in the prospective European Union of 25 Member States or 9.3% of total workforce.

[17] In the European Union, health and social services have an accident rate which is 30% above the average by sector of accidents.

The European Commission has been supporting research activities in ICT for Health for the last two decades. This has placed Europe in a leading position in the use of regional health networks, electronic health records in primary care and deployment of health cards. These developments have contributed to the emergence of an "eHealth industry", which has the potential to become the third largest industry in the health sector, after the pharmaceutical industry and the medical device and imaging industry. By 2010, eHealth spending is expected to account for up to 5% of the total health budget of the European Union's Member States.

The European Union's commitment to eHealth dates back to 1989, when the European Union started to invest its Community Research and Technological Development (RTD) budget in 'healthcare computing'. The first research actions were co-funded through the Advanced Informatics in Medicine Programme (1989-1991) focusing at the computer technologies for medical practice. In the programme running from 1991-1994, the focus was on the development of networks and tools for needs of healthcare professionals, while the focus of the Telematics Applications for Health Programme (1994-1998) was on the continuity of care emphasising users' needs. During the 5th RTD Framework Programme (1998-2002) the eHealth programme was launched, and it channelled European Union research funds into ambient intelligence tools, while the 6th RTD Framework Programme focused on bringing bioinformatics and health informatics together.

In the **2002 eEurope Initiative,**[18] the health chapter emphasised the need for a common European basis for the implementation of an eHealth infrastructure. The vision was of user-friendly, validated and interoperable systems for medical care, disease prevention, and health education through national and regional networks.

The **eEurope 2005 Action Plan**[19] set out number of specific targets for both the European Commission and European Union Member States in eHealth, including the adoption of Electronic Health Cards, the creation and validation of On-Line eHealth Services and the set-up of the European Health Information Network. An important contribution was the emphasis put by the eEurope 2005 Action Plan on paving the way for Member States' use of the European Health Insurance card to promote a common approach to patient identifiers and functions such as the storage of medical emergency data.

In April 2004 the European Commission adopted a joint package of three health related Communications that included the **Action Plan for a European eHealth Area.**[20] The Action Plan advocated the development of interoperability approaches for patient identifiers, medical data messaging and electronic health records. The ultimate goal was to enable access to the patient's electronic health record and emergency data from any place in Europe, even outside a citizen's country of origin or residence, whenever this is required.

The plan identified a challenging list of implementation actions to be undertaken by both the EC and the Member States; it includes a roadmap that extends until 2010. This action plan is embedded in the wider context of achieving the Lisbon Strategy, and the subsequent EU and Member State activities. The creation of a European eHealth area, free patient mobility, and empowerment of the citizen through eHealth services are now core policy objectives of the Union. They are firmly embedded within the framework of the i2010 Initiative.

The activities under the eHealth Action Plan were expected to stimulate investment and beneficial deployment of eHealth solutions across Europe, lead to extensive deployment of health information networks, enable citizens to access quality health knowledge on-line, provide integrated and interoperable eHealth services with full access to citizens' complete medical history and data from anywhere in Europe.

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[18] An Information Society For All. Action Plan prepared by the Council and the European Commission for the Feira European Council 19-20 June 2000

[19] European Commission: eEurope 2005: An information society for all. An Action Plan to be presented in view of the Sevilla European Council, 21/22 June 2002

[20] European Commission: e-Health - making healthcare better for European citizens: An action plan for a European e-Health Area. Brussels 2004 April

The objective of the **eHealth Action Plan** is to address the common challenges of eHealth through shared targets, dissemination of best practice, common benchmarking and international collaboration. The major targets include:

**1. Safe and Efficient Healthcare through eHealth**

Avoidable incidents and accidents have high social and economic costs and eHealth tools such as Electronic Prescribing and Real-Time Decision Support can significantly reduce the number of such accidents and errors. Efficient eHealth tools for health professionals facilitate flexible and collaborative work within and between health institutions as well as between primary and secondary care.

**2. Citizen Empowerment and Support through eHealth**

The internet is a key resource for health information and the development of a European Health Portal was a milestone towards developing the work on quality assurance of health related information on the internet. With the introduction of secure and safe identification of citizens and patients using the internet accompanied by the necessary privacy and security systems and procedures, the potential of network-based support to patients is significant.

**3. Patient Mobility nationally and European wide through eHealth**

The development of electronic health cards and records – as well as improving interoperability within and across borders – helps for patient mobility. The development of European Centres of Reference requires the support to the interoperability of patient electronic health records and standardisation of other eHealth tools such as electronic health cards.

**4. Improving access to care in isolated areas or for deprived citizens**

The internet or videoconferencing can support wide range of applications (second opinions, diagnosis, and assisted surgery) at a distance, which may facilitate healthcare provision in remote or isolated areas or to deprived and vulnerable citizens.

**5. Developing a European market for eHealth**

A clear legislative framework supporting the use of transborder eHealth technologies within a context of common patient identifiers, shared security protocols, and open eHealth markets is needed. Many information and communication technologies are already available, but health systems are complex structures and ethical, financial, and legislative issues need to be resolved before a European eHealth Area can completely be a reality.

The Commission recognised the importance of support from all Member States in achieving and realising the potential of eHealth and as an outcome each Member State was asked to develop an eHealth Road Map. This addresses the challenges of providing citizen-centred healthcare services in a context of rising expectations, aging populations, increased mobility and limited budgetary conditions.

Related to the implementation of the European eHealth Action Plan, most of the Member States have now adopted some eHealth Road Maps and many have started to roll out implementation of key eHealth tools and services. While the tools and services being implemented are wide, the most common eHealth applications provided for in the Road Maps of the Member States have been the electronic health records, the citizen's public health portals, the health cards and the ePrescriptions.

The **i2010: A European Information Society initiative**[21] has been stimulating the take-up of information and communication technologies to strengthen the eEurope agenda. The new initiative promotes a clear environment for electronic communications and digital services, increased research and innovation in information and communication technologies and an Information Society dedicated to inclusion and quality of life. The eHealth is an important part of the strategy as within *i2010: a European Information Society for growth and employment* the contribution of eHealth lies in all three

[21] European Commission: i2010 – A European Information Society for growth and employment". Brussels 2006

of the proposed areas – information space, innovation, and inclusion. All i2010 activities are closely linked to Europe's eHealth Action Plan.

**1. Health Information Space**

The development of an information space for Europe would be a step forward from the 2004 proposals for European eHealth Area by including interoperable health information resources, tools and applications for clinical care and research, developing regional and national health information networks, using electronic health records and health-related cards, telehealth services and transfer of data through advanced network technologies.

**2. Innovation and investment in research**

The Health Information Space contributes to the creation of innovation and investment in new research areas and to the expansion of the knowledge-based economy. Both bio-medical start-ups may find favourable environment to launch their added value services and existing industries may expand.

**3. Inclusion, better public services, and quality of life**

eHealth activities and deployment of personal health systems contribute to mobility and independent living of patients including chronically ill, but also elderly ones. There is a need for further progress in this field as health, medical, and demographic concerns relating to ageing persons are a challenge for the effective functioning of Europe's healthcare systems.

**4. Benchmarking and best practices**

i2010 puts emphasis on benchmarking and good/best practices through surveys, studies, conferences, fora and awards.

The European polices in eHealth made a big step forward in the last 15 years from focusing on developing certain key technologies to providing a general framework focusing on information, inclusion, healthcare and information society developments. Current priorities of the European policies in eHealth lie in the provision of the most important frameworks for the development of eHealth, including the policy and exchange of information, the supply-side (innovation and information provision) as well as the demand side framework (the inclusion of everyone and supply of services to all users).

Altogether, the role of the European Union is not to intervene is such particular issues as the practical coordination and management of the hospitals by the Member States or how to build the financing of their healthcare systems. Rather, as a supra-national structure, the European Union's added value comes through such initiatives and instruments as studies, framework approaches, and exchange of experiences and good practices.

The method of open coordination may serve as a useful tool to exchange and disseminate best practices, share the forward-looking options and solution. Although the myopia of policy makers and the rules in the national legislations lead to a situation where changes at the national level begin after being confronted by their own bad experiences, it is likely that solutions in one country will be applicable to another. Finally, the European Union can also play a crucial role in creating the framework conditions for legal, institutional and financial framework in which the healthcare systems operate.[22]

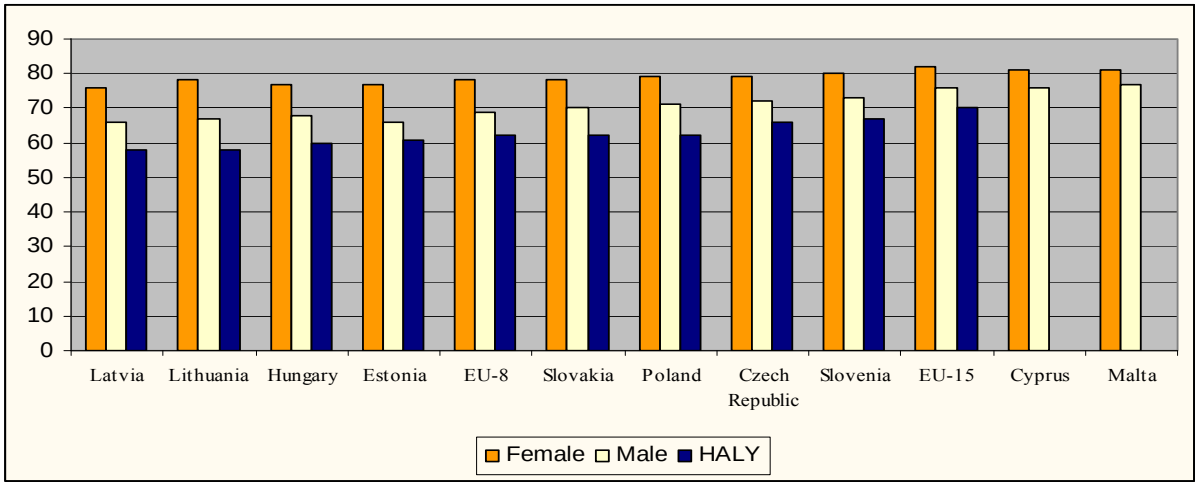
## I.2. Healthcare systems in the EU10

The provision, content and quality of eHealth services depends on various factors including the main structural, institutional and financing features of the healthcare systems as well as the health status of the population, the incidence of various diseases. Before describing the eHealth services themselves, it is useful to present some evidence on the health indicators and systems of the EU10.

[22] The Commission is planning to establish a framework." Developing Community Framework for Safe, High Quality and Efficient Health Services"

**Health indicators and demographics in the EU10.** The EU10 countries have overall poorer health status than the EU15: among them life expectancy and high mortality rates caused by particular and above the European average death causes are the most characteristic ones. In the EU10 average life expectancy is below the EU15 average: in Slovenia, the Czech Republic and the two island countries by 1-4 years, while in the Baltic States and Hungary by almost 6-11 years. One factor behind this gap is the much lower life expectancy of the male population: the gaps between the male and female life expectancies among the two country groups are five and nine years. The figure is even worse when the Health Adjusted Life Expectancy (HALY) is used, when the average difference rises to eleven years.

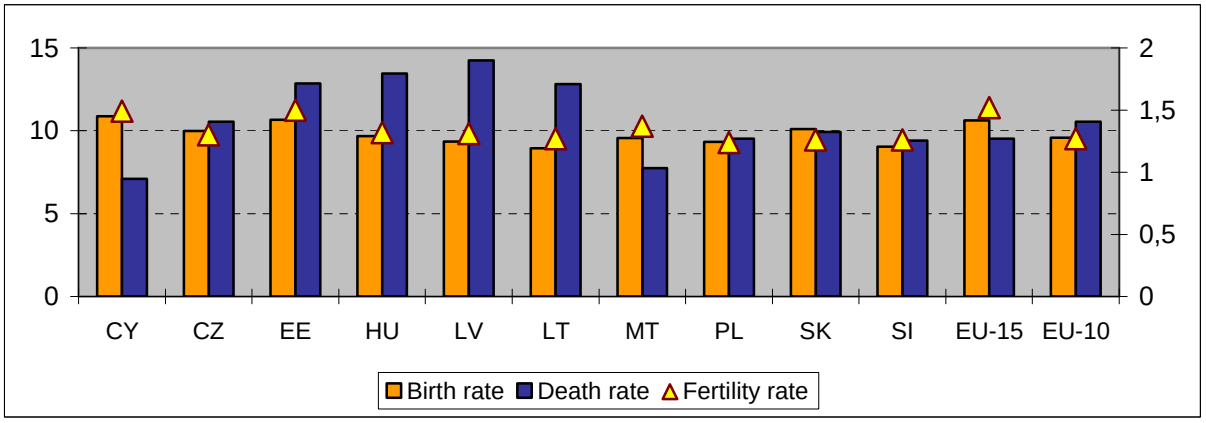
**Figure 1. Life expectancy: raw and health adjusted data (HALY) in years**




Source: Eurostat (2005)

The health status of the population is also reflected in the demographic trends as with the exception of Cyprus, Malta and Slovenia, the population of the EU10 declines or remains unchanged. While birth rates are below 1% (0.9% on average) in the EU10 and higher in the EU15 (1.1%), death rates are the reverse with 1.2% and 0.9% respectively. The factors behind the stabilising or declining population are the gaps in the mortality rate and the lower fertility rate, which is above the 1.48 average of the EU15 only in Cyprus and Malta (Figure2), the strong emigration (as net migration has a positive balance only in Hungary and Slovenia, and overall an outward migration prevails in most EU10).

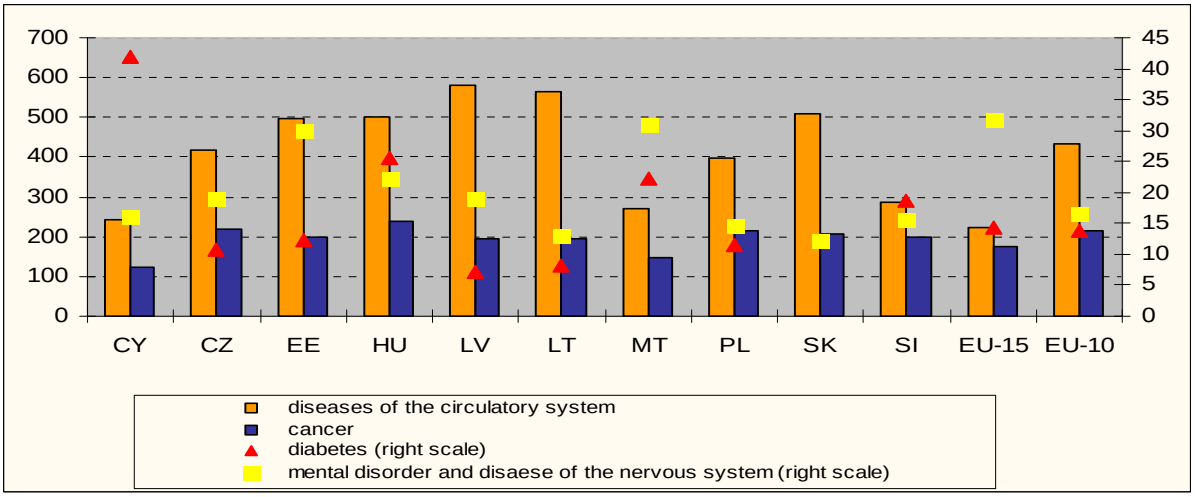
**Figure 2. Fertility, birth and death rates (%)**




Source: Eurostat (2005)

Various factors are behind the higher death rates, which exceed in the EU10 the level of EU15 by 25%. One of them is the above average incidence of certain death causes, including cardiovascular diseases, cancer and neuropsychiatric disorders. Linked to lower life expectancy of the male population, the mortality rate of the middle age male population is 2.5 times higher in the EU10 than in the EU15.

**Figure 3. Major death causes for 100 000 citizens**

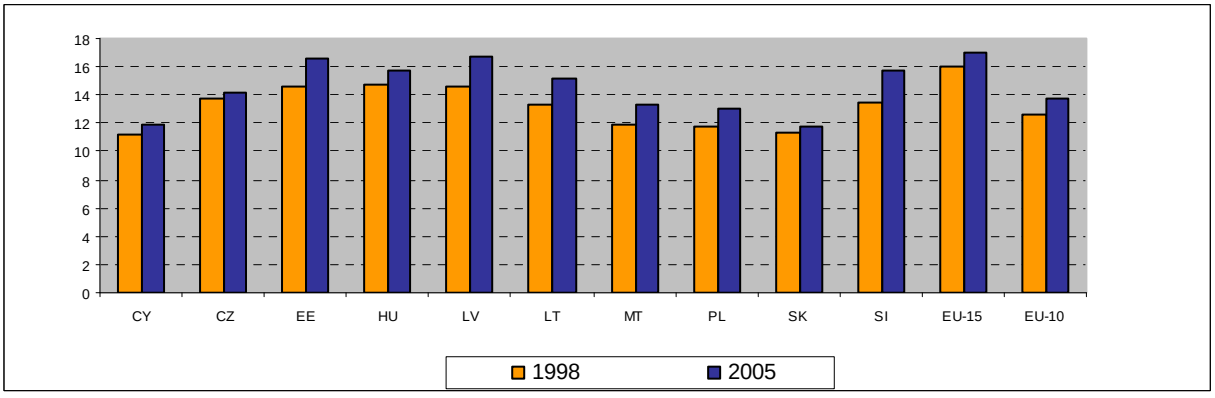



Source: Eurostat (2005)

Health sector developments in the EU10 countries are increasingly influenced by population ageing, which have begun later than in the EU15. The demographic situation is still somewhat different in the EU10 than in the EU15, as the share of younger generation is higher and of older lower: the respective figures in 2004 for younger generations (younger than 14 years) were 16% and 18% for the EU15 and EU10, while for the older (older than 65) 14% and 12%.

However, one should note that aging is present and the share of population over 65 has grown faster in recent decade in the EU10 than in the EU15: as the next Figure shows, while in 1998 this ratio was 12% in the EU10 and 16% in the EU15, it increased until 2005 to 14% and 17%, respectively. As a result of these changes, ageing puts an increasing pressure both on healthcare and pension systems reflected in rising health sector expenditures, medicine costs and related budget subsidies.

**Figure 4. Share of population over 65 (%)**



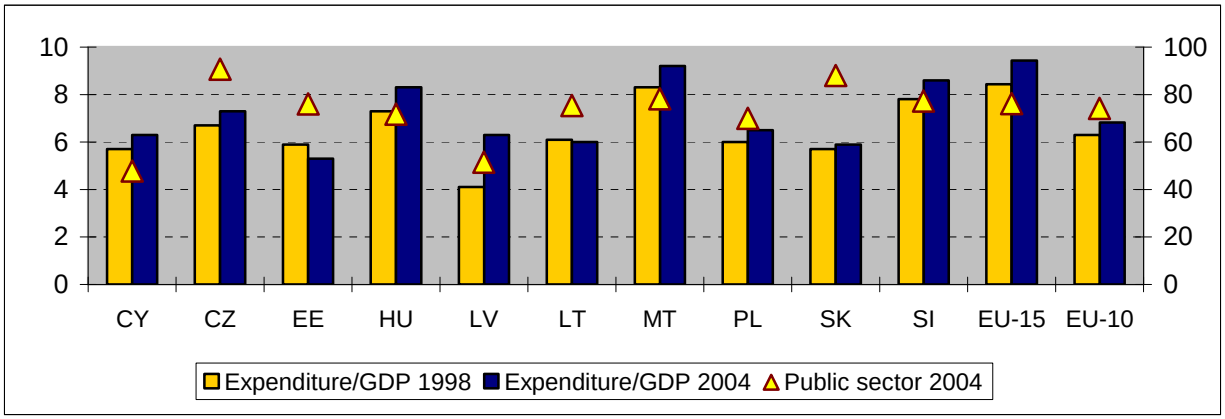

Source: Eurostat (2005)

**Healthcare spending.** The EU10 spends on healthcare generally a rising, but still lower share of their GDP than the EU15. There has been a drastic decline of healthcare expenditures in the EU10 during the structural, institutional changes of the 1990s with their gradual recovery in recent years. Notwithstanding that in 2004 the average level of healthcare expenditures of GDP was 9.4 % in the EU15, and only 6.83 % in the EU10:[23] the EU10 spends lower proportion of their GDP on healthcare.[24]

[23] The average hides significant differences among the EU10 in the level of healthcare spending. Malta (9.2%) and Slovenia (8.6%) spend the most of their GDP on health, while Estonia (5.3%) and Slovakia (5.9%) the least.

[24] This statement is true even if one considers the extensive reliance on gratitude money in the EU10 countries. Various estimates state that financing of the healthcare sector through gratitude money may reach 1-1.5% of GDP in the EU10.

**Figure 5. Health expenditure/GDP and public sector health spending in total (right scale) (%)**




Source: Eurostat (2005)

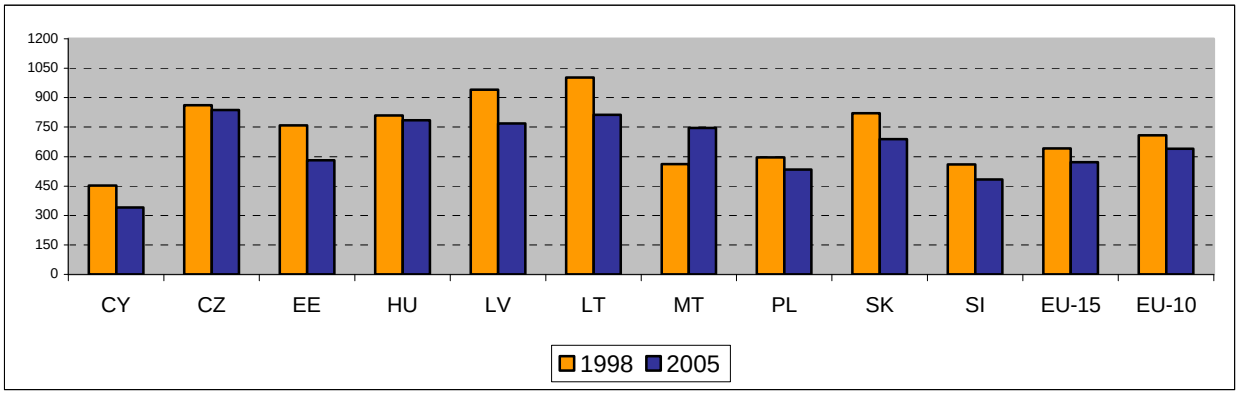
In per capita terms the gaps are even more striking between the two country groups. If measured by the Purchasing Power Standards (PPS) the adjusted per capita healthcare spending was Euro 1891 in the EU15, while only somewhat less than one third of that in the EU10 (Euro 624).[25] Most of the healthcare services are provided by public institutions and the share of private sector is lower than in the EU15. On average around 75% of healthcare expenditures is public in the EU10, with the Baltic States remaining closer to 70% while Slovakia, Slovenia and the Czech Republic above 80%. As the recent decade saw cost explosion in the healthcare services in the NMS as well, while the efficiency of service provision improved only modestly, the low level of healthcare related spending is insufficient to cover the growing expenditures.

**Healthcare providers.** Some of the problems are linked to the weaknesses of the regulatory and incentive framework for healthcare providers. The financing models are institution centred supporting bigger providers, which together with the described structural features of the healthcare system leads to much higher number of hospital beds in the EU10 than in the EU15: the average for 100.000 inhabitants for the former was 780, while for the latter around 600.[26]

[25] However, one should consider that the adjustment to PPS means the elimination of price differences and a calculation on a unified price level. Then, considering the actual exchange rates and the price differences, the gap in real expenditures is reduced, as the lower price level in the EU10 produces higher per capita spending at the actual exchange rate.

[26] At the same time as the figure shows, the financing pressures, the ongoing institutional reforms have already reduced the number of hospital beds in almost all NMS similar to most of the EU15. On average the number declined faster in the EU-8 than in the EU15 with some countries – especially the Baltic States and Poland – experiencing very fast declines. At the same time it is interesting to note the high and increasing level in the Czech Republic.

**Figure 6. The number of hospital beds per 100 000 citizens**




Source: Eurostat (2005)

The distortions in the financing model make the providers of healthcare service interested in longer and less efficient treatments: the average number of days spent in hospital per patient was 6.7 in the EU15 and 7.9 in the EU10 in 2004. In relation to the institutional structures, the financing incentives increase the level of hospitalisation instead of out-patient treatment, force healthcare providers to hospitalise the patients leading to more expensive treatments.

Another structural distortion is related to the demand and supply of healthcare workers. The number of primary care doctors and nurses is lower in the EU10 than in EU15 and the only exception is specialised doctors. The number of physicians has been increasing in recent years but there are structural distortions in the system leading to a mismatch among the supplied and demanded doctors. The education system has generally been slow to respond to changes in the demand for doctors, and the financing incentives did not support the healthcare providers in their fast change of supplied services, creating in various professions oversupply, while in others excess demand for certain types of doctors.

A further general problem is the relatively low formal wage level, which in many countries is made sustainable through the presence of gratitude money.[27] This combination of low formal and higher informal pay leads to lower efficiency, blocks the institutional changes by creating counterincentives for senior healthcare workers, and leads to measurement and monitoring problems.

**Health sector developments.** The development of the healthcare systems in the New Member States (NMS) has been determined both by factors similar to the rest of the EU countries and NMS-specific ones. Among the former the cost explosion in healthcare provision due to the fast technological progress, the ageing of societies and increase in the number of those who require health treatments, the increase of healthcare-related spending both in the public and private sectors, the doubts over the sustainability of the existing health insurance schemes, the gradual reforms in the provision, financing and institutional structure of the healthcare systems are the most relevant ones.

The NMS-specific features are related to the lower level of economic development, to the overall worse health indicators, and to the institutional, financing legacy of the socialist system in eight of the ten NMS-countries. As most of the EU10 was a socialist economy, the process of economic transition and the shift to the market economy have also affected healthcare developments. Transition related impacts included among others generally worsening healthcare indicators, serious difficulties with revenue collection, partial and generally still very limited privatisation of the providers of healthcare services, uncertain ownership structure, frequent and uncertain changes in the regulatory framework.

[27] Due to the under-financing of healthcare services, low level of incomes earned in the healthcare sector, dominance of public ownership, gratitude money plays an important and unrecorded role in the financing of the healthcare sector. It refers to grey or hidden payments from the patients to the service providing institutions and healthcare workers. Some estimate that the additional funding from this source may reach 10% of the total expenditures on the health sector.

There are various structural distortions that have affected the evolution of the healthcare services in the EU10, but especially in the EU8[28] countries. Some of these distortions are related among others to the unfavourable share of preventive and curative healthcare, hospitalisation versus out-patient treatment, a significant gap between the supply of and demand for healthcare services, significant explosion of pharmaceuticals related expenditures.

**The financing model.** The final important factor shaping healthcare developments is the prevailing institutional and financing model. The institutional framework is characterised by the predominant role of the public sector,[29] by the presence of principal-agent problem[30] and by the overlapping institutional responsibilities among various healthcare providers. The financing model - with some minor exceptions – relies on publicly run social security funds covering their expenditures from taxes or social security fees. Even in countries where there is a multi insurance model, the share of the private insurance funds remains limited.[31]

**The insurance models.** The healthcare insurance system has country specific features in the EU10, including countries with one or multiple insurance companies, with local or foreign owned insurance providers among others. In most of the countries, the centralised, one insurer model applies: the patients are registered at the national health insurance fund, which covers the costs of their healthcare.

For example, in Hungary, where the one insurer model applies, the National Health Insurance Fund Administration (NHIFA) provides financing for healthcare services by buying the services from the public and private suppliers and by financing them from the collected contributions and fees. NHIFA engages in contractual relation both with private and public providers of healthcare services ranging from pharmacies and family doctors to big municipal hospitals and clinics.

In the other case, the multiple insurance models in the Czech Republic is also based on the compulsory insurance, but the services are administered by nine public health insurance companies, which are independent non-profit bodies, whose surplus goes to a special account, the Reserve Fund. The system is financed from the contributions of individuals, employers and the state on behalf of the unemployed, pensioners, students and children. Opting out of the insurance system is not permitted, and the state acts as guarantor of the system.

**Recent attempts of reforms in the health sector.** Reflecting the pressures stemming from financial sustainability, cost explosion, worsening health service quality and major health status indicators, most of the EU10 initiated reforms in their health sectors. While the scope, elements and outcome of the reforms have been country specific, there were some common elements.

First, a main element has been the reform of the contribution system, which focused on broadening the taxable income base, increasing the contribution rates to the healthcare system. Related both to funding and to inserting pressure on service providers, some countries have been trying to create a multiple insurance model for financing expenditures and selecting service providers. In countries, where such service providers exist, the policy reforms focus at increasing the level of competition between insurance funds and reducing the asymmetries prevailing in their size.

Second, the reforms in most of the EU10 also focus at institutional rationalisation to streamline the healthcare sector and reduce the overlapping institutional functions. Institutional reforms try to consolidate the number of service providers, define better their competencies, thus reducing the existing overlaps and excess supply capacities, simplify the structure of funding and rules governing

[28] The EU-8 countries are the Central European and Baltic New Members of the European Union: Estonia, Latvia and Lithuania as well as Poland, the Czech Republic, Slovakia, Hungary and Slovenia.

[29] The involvement of the private sector has remained so far limited to supplementary healthcare services and in certain areas (dentist, home doctors, part of the first aid service, etc.)

[30] The principal-agent problem refers here to the inefficiencies stemming from the volatile ownership structure, unclear preferences given by owners to the managers, the deep asymmetries in the information pool available for managers and owners.

[31] This is quite similar to the altogether very constrained formal financial contribution of the private sector in co-payment.

healthcare institutions. Finally, reforms in many countries are directed at long-term structural issues, including the ways of financing healthcare and determining the role of private sector.

**Challenges faced by the healthcare sector.** There are several challenges faced by the healthcare sectors of EU10. One of the major challenges is to achieve significant improvement in the main healthcare indicators reflecting the health status of the population: this refers especially to the area of life and health adjusted life expectancy, death and fertility rates, major chronic diseases and death causes. The poor healthcare indicators have serious costs in terms of lost labour hours, lower labour productivity and by themselves contribute to keep employment rates at low levels. The links between health status and economic growth are well documented and improving health status may help in fostering economic growth too.

Another important challenge is to contain the fast increase in costs, which involves several measures ranging from institutional rationalisation, regulatory changes (financial incentives for service providers, drug subsidies, etc.) and technological modernisation. Cost containment and related institutional changes also include the reduction in the mismatch between supplied and demanded healthcare services, changing the preference for hospitalisation vs. out-patient treatments or in the relative weight of preventive and curative treatments.

The third major challenge is to increase both competition and private sector involvement in the healthcare sector in order to raise efficiency and the effectiveness of the sector. There should be more areas, where the market is open for private providers and the competition between various healthcare units should also be supported.

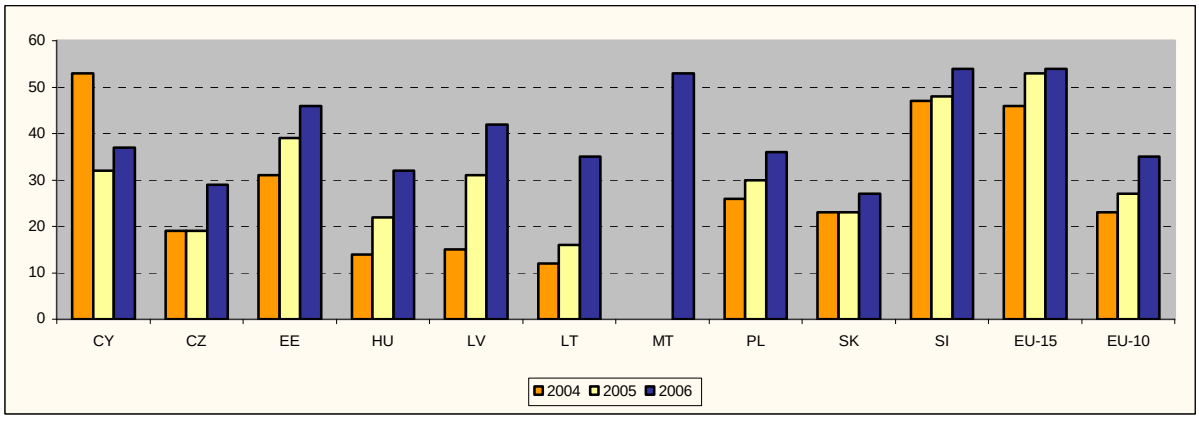
A final challenge is to reduce the gaps existing in the access to healthcare services caused by income, age and regional divides. Besides demand side differences, there are significant gaps on the supply side, including the quality of services, the technical and human capacities of the institutions providing them, which create further divides within these societies.

## I.3. ICT-related Information Society developments in the EU10

Both the supply of and demand for eHealth services is influenced by the overall level of ICT development. There are several aspects of information society developments that matter for the provision and usage of eHealth services, including penetration, diffusion and usage of ICTs.

**Access and penetration levels.** One of the key elements for eServices from the development of information society is the evolution of penetration. The share of households with Internet connection at home was 37% in the EU10 in 2006, while 53% in the EU15. Comparing them to the figures for 2004 (29% and 46%) shows that the increase of penetration rate accelerated in the EU10 and the gap between them and the EU15 diminished somewhat. However, only Slovenia, Malta and to a smaller extent Estonia approach the average level of EU15, and other countries lag behind with several countries (Lithuania, Latvia, the Czech Republic and Hungary) having less then 20% of households with Internet connection at home.

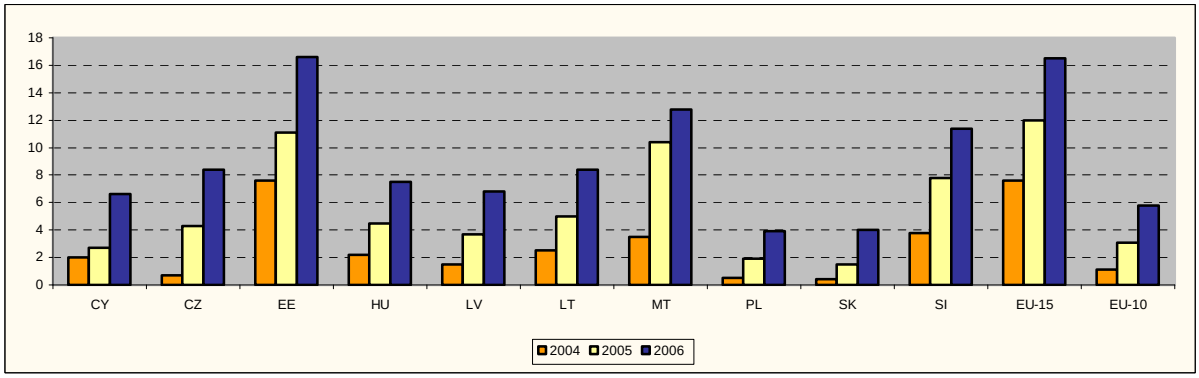
**Figure 7. Percentage of households with Internet connection at home**




Source: Eurostat (2006)

In level of broadband penetration the EU10 lags behind the EU15 as the number of broadband lines in percentage of total population in 2006 was 5.9% and 16.5%: moreover, in 2006 only Estonia had broadband penetration rates comparable to EU15.[32] Broadband access in the EU10 increased considerably in recent years, especially in 2005, when the share of households with broadband connection more than doubled from 7% to 15%.[33] Estonia outperformed most of the EU15, as almost 30% of the households connected to the Internet gained access to broadband.

**Figure 8. Broadband penetration rate in % of total population**




Source: Eurostat (2005)

Relatively high percentage of households in the EU10 are connected to the Internet via broadband, and in some cases the figures are higher than in the EU15, as due to the later start of ICT usage those households that connected themselves to Internet switched immediately to broadband, skipping the phase of narrow band connections.

**Diffusion of ICTs.** When taking stock, the EU10 on average and most countries in particular lag behind the EU15 in the diffusion of ICTs, including the major access, penetration, content and usage indicators. The differences could be explained by low demand capacity for and affordability of ICTs, the pressing regional divides, the absence of threshold effects and the delays in adopting and implementing appropriate ICT policies. Moreover, the development of information society started

[32] The major factors explaining the existence of the broadband penetration gap are the lower level of affordability, the lack of appropriate and awareness raising content and its belated diffusion. While in the EU15 broadband technology started to be deployed more actively already from the beginning of the decade, broadband has gained popularity in EU-8 only since 2003, when EU-8 governments turned their attention to broadband developments, devoted more resources to accelerate deployment both in the private and public sectors.

[33] At the same time the expansion was slower in the EU15, increasing from 17% to 25%.

with delay compared to EU15, the funding available both in the public and private sectors has been more limited, the pressing structural transformation of the EU-8 countries diverted the attention of policy makers for long time to other priorities.

However, in the last two-three years the gaps between the two country groups started to narrow as the EU10 countries - realising the potential economic and social benefits - put significant effort at improving the level of their ICT development. The EU10 countries have in recent years shown fast increases in Internet use and broadband penetration, number of personal computers, Public Internet Access Points (PIAPs), and other important penetration indicators.

As a result, the picture concerning diffusion and availability has changed considerably compared with 2002-2003. By that time the major constraint facing information society developments was the low level of access, which hindered the entry of various groups of users. The unequal but altogether fast expansion of access in the EU-8 reduced the importance of this issue to the problem of certain regions, user groups, which have been unable to benefit from the overall improvement in availability or which have been adversely affected by various social and economic divides. Access and diffusion of ICTs is no longer a universal and primary barrier, but it remains a constraint in remote areas, in less developed regions, in socially retarded strata and user groups.

**Usage and motivation.** When access barriers are overcome, usage and motivation in the households sector is not different in the EU10 from the survey results for EU15: quite similar patterns and trends emerge in both country groups. While there are still gaps in the major indicators of the household and public sectors, the corporate sector has similar or sometimes even better level of ICT readiness (such as broadband penetration, secure servers, eCommerce share in total revenues, etc.) in the EU10 than in the EU15.

The EU10 countries are far from being homogenous as the differences among them are sometimes greater than between them and the rest of Europe. The standard deviation of the indicator levels is much higher among the EU10 than in the EU15, and there are some countries which generally under perform the averages of the EU10, while Estonia and Slovenia generally exceed with their indicators the average of the EU15.

Besides the differences among the individual countries, the digital divide inside the countries is an important barrier to ICT developments, which frequently coincides – after the turbulent years of structural and institutional changes – with deep regional, income, and other societal divides.[34] Its long-term presence and coincidence with high incidence of poverty, unemployment, and collapsing regions creates difficulties for eService developments.

ICT diffusion has been characterised by problems linked to affordability of services, generally caused by the insufficient level of competition, which prevented many from the access to these services. The major reason behind this has been the emergence of mono- or oligopolistic market structures, the difficulties of entry to the market and weaknesses of regulatory authorities. Competition has started to intensify in many of the EU10 countries only in recent years, which resulted besides quality improvements in price declines.

Altogether recent years saw an accelerated improvement in major penetration and access indicators in the NMS. This was equally true for the service providers thanks to the expansion of ICTs inside the public sector and service institutions, as well as to their better diffusion among users. While the average level of interaction has improved, there are still sizeable social groups, regions and users, who have disadvantages in accessing eHealth and other eServices.

[34] Part of the digital divide can be reduced by appropriate policies (connecting the remote areas to broadband networks), part of it depends on indirect and non-ICT related policies (education and training of the labour force), while part of it is a generational problem.

# II. THE LEVEL OF E-HEALTH DEVELOPMENT IN THE EU10

## II.1. Main statistical and descriptive data on eHealth services

Statistical information is rare on the provision and usage of eHealth services even within the individual countries, not to mention comparable data for the majority of the ten states. Nevertheless some of the eGovernment IDABC statistics may also be used for information regarding eHealth services provided for citizens in general, and additional less comparable information is provided from the cases of the country reports.

**The main eHealth services**

In terms of administering the social security contributions, the most relevant item from the cited database is the availability of medical cost administration within the social security contribution system.

**Table 1. Health-related eGovernment services - Social Security contributions in 2005**[35]

| | CY | CZ | EE | HU | LV | LT | MT | PL | SK | SI |
|---|---|---|---|---|---|---|---|---|---|---|
| **For the household sector/citizens** | | | | | | | | | | |
| Social Security Contributions | | | | | | | | | | |
| Unemployment benefits | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 2 |
| Family allowances | 2 | 4 | 4 | 2 | 4 | 2 | 2 | 1 | 2 | 2 |
| Medical costs | **2** | **3-4** | **4** | **2** | **2** | **N.A.*** | **N.A.** | **2** | **1** | **1** |
| Student grants | 2 | N.A. | 1 | 1-2 | 2 | 2 | 2 | 0 | 0 | 2 |
| **For the business sector** | | | | | | | | | | |
| Social Contribution for Employees | 1 | 3 | 4 | 2 | 1 | 3 | 4 | 4 | 4 | 0 |

Source: European Commission – Web Based Survey on Electronic Public Services 2006

The table shows two distinct features of eHealth in the NMS, which are also applicable for other online public services. First, the level of online availability for the business sector is higher than for households/citizens (similar to other eGovernment services) This reflects the priority of revenue collection in online public service developments and the usage of eServices to improve the collection of revenues from the corporate sector.

Second, there are significant differences in the level of online sophistication of health services. For example, while in collection of social security contributions the Czech Republic and Estonia reached high (3/4 and 4) levels with two-way interaction and full transactions, others lag behind with one way interaction or basic provision of information.

Another area of online health services is the **recording, maintenance and processing of the data** of clients by insurance companies. The provision of information between the clients and insurance companies is done online. Some of the insurance companies offer services to clients in the forms of downloadable documents and payment records.

The health insurance system has country specific features in the EU10, including countries with one or multiple insurance model, with local or foreign providers. In most of countries, the one insurer model applies: the patients are registered at the national health insurance fund, which covers the costs of their healthcare.

[35] The figures in the table are the levels of online sophistication of services. They are presented according to the following scaling:
Stage 1: Information: online information about public services
Stage 2: Interaction: downloading of forms
Stage 3: Two-way interaction: processing of forms. including authentication
Stage 4: Transaction: full case handling. decision and delivery (payment)

In the Czech Republic the communication between the nine health insurers and the providers is electronic; some of the insurance companies also offer services to clients such as downloadable forms and statements of claims through their portals. The statements are available in real time, not on the annual statement of expenses basis. The service belongs to the responsibility of the Centre for International Reimbursement (www.cmu.cz) and its sophistication stage is 3-4/4 according the IDABC classification (depending on the insurance company).

The Estonian Health Insurance Fund (EHIF) is the largest eHealth services supplier ***in Estonia***. All transactions are handled fully on-line. Insured persons can use eCitizen portal (http://x-tee.riik.ee/portaal/) in order to use the following services: check their insurance status, check the temporary work inability allowance request status, apply for EU health insurance card, apply and process the additional reimbursement for drug costs.

Another area of eHealth service is the creation of integrated national health information systems, which is aimed for by nearly all countries, but only few have fulfilled it already. The Czech Republic introduced UZIS (www.uzis.cz), a portal with mainly statistics and information on healthcare providers, Hungary has these services but still in a disintegrated form, while Cyprus plans to develop the Integrated Healthcare Information Support (HCIS) System, which would integrate with other systems and institutions from both the government and non-government sectors.

Estonia launched the National Health Information System (NHIS), whose task is to develop nationwide framework (database) that facilitates the exchange of health information, currently available only in local databases and not interoperable, separate information systems. The main components of the NHIS are: Digital Health Record, containing critical information about all individuals in Estonia; digital appointment booking system; digital prescription system; digital medical image database; digital blood-bank database; national health registries.

A common focus of national eHealth developments is the **creation and launch of eHealth Cards**, although the main aim and the level of achieved sophistication also varies among the countries. The development of eCards is in line with the European trends and policy priorities. The achieved level depends ICT development and sophistication and policy determination to develop it.

In the Czech Republic, the classic eCard information is accessible via the Internet and IZIP (www.izip.cz) is the system designed for internet access to electronic health records (EHRs). The ePrescription feature is currently under development. The security of data is currently guaranteed by a password and PIN system.

The "**Health-related services"** item in the IDABC database gathers various eHealth services into one group (interactive advice on the availability of services in different hospitals; appointments for hospitals, etc.). The sophistication level is very low for all countries, as the table below shows it was level 1 across the region.[36] There are two exceptions as the *Report of the 6th Measurement - 2006 June* study shows that Malta has reached level 4 and Hungary level 2 in the provision of this service.

[36] Level 1 means that "The information necessary to start the procedure to obtain an appointment at a hospital is available on a publicly accessible website managed by the service provider or by the administrative responsible level".

**Table 2. The level of online sophistication of health-related services for the households/citizens in 2005**[37]

| | CY | CZ | EE | HU | LV | LT | MT | PL | SK | SI |
|---|---|---|---|---|---|---|---|---|---|---|
| Health-related Services | 1 | 1 | N.A. | 2 | 1 | 1 | 4 | 1 | 1 | 1 |

Source: European Commission – Web Based Survey on Electronic Public Services 2006

Out of the major service areas, eHealth developments in the NMS seem to focus on services related to administration and setting up information bases and databases. Among the sub-categories given for the definition of eHealth, the provision of information to citizens and the management of patient health records have received significant support in recent years.

> In Slovakia, the Ministry of Health has only recently launched its eHealth portal (www.zdravie.sk), which combines existing sources of information of institutions, laws and regulations, description of diagnosis. It also offers opportunity to consult health problems with specialists and allows citizens to download some forms for printing out (www.health.gov.sk). The National Centre for Health Information, responsible for data gathering for health sector plans to introduce electronic data collection in the near future; at present it is still paper-based (www.uzis.sk). Most hospitals have own websites but these do not have the character of eHealth services as they provide names of departments and names of responsible persons at the level of the department.

On the other hand there is very limited and not comparable information available about telemedicine services, about telecare and independent living services.

> One of the few telecare pilot projects implemented in Lithuania is the Kaunas eHealth Cluster consisting of Kaunas University of Medicine Hospital, Telemedicine Centre, and Institute for Biomedical Research, Kaunas University of Technology. The network is used for clinical practice with main attention towards patients and physicians. Network uses a synergy of clinician's communication in Lithuania and Sweden (Stockholm St.Erik Eye Hospital, Lund University Hospital), being involved in teleconsultations, education and research.

The Country Reports determined that most of the development that takes place in the EU10 can be divided into two groups: developments that are related to the general and slow updating of ICT infrastructure of hospitals and other medical units, and isolated pilot projects that are innovative, but not widely applied. like the DITIS project in Cyprus.

> The DITIS (Collaborative Virtual Medical Team for Home Healthcare of Cancer Patients) (www.ditis.ucy.ac.cy) project in Cyprus, is a system, that supports Collaborative Virtual Healthcare Teams dealing with the home-healthcare of cancer patients in Cyprus. It is a web based system that enables the effective management and collaboration of virtual healthcare teams. It provides a secure access to medical information from anyplace and anytime via desktop computers (at work) or a variety of mobile devices from anytime and any place. It includes a set of tools for effective scheduling and coordination of team members, with features including automatic notification and alerting.

## Funding eHealth services

The picture of funding eHealth development is diverse but concentrated. In most cases, public financing from the state budget is dedicated to support the moderately ambitious developments, mostly in case of administration- or database, registry-type eHealth services. Online services for social

[37] See the description of levels of sophistication in footnote 21.

security contributions, the national health systems with portal are in most countries developed from public funding.

The role of the private sector is limited, and PPP solutions are not found on the level of major projects. Private funding is more frequent in case of private medical actors, hospitals and commercially oriented health-information websites.

In selected cases, World Bank and WHO initiatives[38] also contribute to eHealth developments of the countries. These projects have focused on health sector development and apply eSolutions as one of the means to improve health services, which is a very integrated view of eHealth.

The Structural Funds have not played so far crucial role in eHealth developments, although many pilot projects were launched in 2004-2006. In most countries, there is an increase in eHealth spending planned for 2007-2013.

> In Hungary there was a key pilot project under the Human Resources Operative Programme of the National Development Plan for developing eHealth systems in the underdeveloped regions. The action with a total budget of EUR 16 million had three main components: to design the protocols and standards for interoperability of the electronic data and services of the different regional actors of health and social care services; the modernisation of the individual systems of each institution, including LAN, integrated medical and financial information systems; and special trainings to raise the ICT literacy of the staff. Regarding the specific eHealth services, the action focused at developing standards for eMedical Records, eConsultation and ePrescription.

[38] Slovakia has been one of the main recipients of these projects.

**Usage of eHealth services**

The usage of eHealth services has been growing fast, as the data below shows (see Table 3). Data comparable for both 2005 and 2006 is only available for the first entry, which shows that the interest for searching health-related information via the Internet grew from 9.4% to 14.3% in the EU10, while it increased from 18.1% to 21.4% in the EU15. The growth is not only due to the improvement of health information on the Internet, but is also related to the increase of Internet penetration and usage in the EU10.

**Table 3. Percentage of population (aged 16 and over) using Internet to seek health information whether for themselves or others[39]**

| | CY | CZ | EE | HU | LV | LT | MT | PL | SK | SI | EU15 | EU10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **% of individuals who used Internet for seeking health information - Injury, disease or nutrition (2006)** | 10.6 | 10.0 | 18.0 | 16.6 | 11.6 | 15.4 | n.a. | 10.9 | 13.6 | 21.8 | 21.4 | 14.3 |
| **% of individuals who used Internet for seeking health information - Injury, disease or nutrition (2005)** | 8.0 | 3.5 | 16.4 | 9.6 | 7.4 | 8.5 | n.a. | 7.1 | 9.1 | 15.4 | 18.1 | 9.4 |
| **% of individuals who used Internet for seeking medical advice with a practitioner** | 0.3 | 0.3 | 10.9 | 0.8 | 0.5 | 1.2 | n.a. | 0.4 | 0.0 | n.a. | 1.7 | 1.8[1] |
| **% of individuals who used Internet for making an appointment with a practitioner** | 0.1 | 0.4 | 8.4 | 0.4 | 0.1 | 0.3 | n.a. | 0.1 | 0.2 | n.a. | 0.6 | 1,3[1] |
| **% of individuals who used Internet for requesting a prescription online from a practitioner** | 0.2 | n.a. | 4.9 | 0.2 | 0.1 | 0.0 | n.a. | 0.1 | 0.0 | 0.0 | 0.5 | 0.8[2] |

Source: Eurostat 2006

While the growth in the number of individuals seeking health information has increased, Table 3 shows that the scope for using Internet for various eHealth services is still limited. Compared with the 14.3% share of the individuals using the Internet for information, the share of those who use it for making appointments or requesting medical advice is 1%. This is however not a phenomenon specific to the EU10 as the figures are not remarkably higher for the EU15 countries either.

Altogether, the scope of eHealth services is rather limited in the NMS. They mainly focus at services related to administration and setting up information bases and databases, provision of information and securing the collection of social security revenues. The level of service development is especially low in case of telecare and independent living and the quality and sophistication of integrated patient management and of their health records is also in its infancy.

## II.2. Institutional, financial and regulatory frameworks of eHealth

### II.2.1 Main institutions providing eHealth and their financing structure: organisational overview

eHealth related policies and development plans for eHealth services in EU10 are largely formulated by the public sector, especially the central governments. Governments are also responsible for the

[39] Notes: EU10 average based on calculations without Malta except two cases:
1-EU10 average based on calculations without Slovenia and Malta
2-EU10 average based on calculations without Czech Republic and Malta

implementation of the policies, for the making of the action plans, coordination of the planned development and the monitoring.

The activities in eHealth area in the EU10 are performed by a number of government and semi-government bodies, which are playing different roles in advancing the eHealth policy and eHealth Services. However, the Ministry of Health remains a focal point for planning the development of the eHealth in EU10 (the exception is Estonian Ministry of Social Affairs). In half of EU10 (CY, CZ, HU, SI, SK) the Ministry of Health established number of different sub-bodies (sections, departments, committee and council), which focus directly to the eHealth development. These sub-bodies in most cases employ highly specialized national eHealth experts.

In six EU10 (CY, CZ, EE, SK, MT, PL), there is a central specialized body, which prepares mainly all major ICT related strategies and policies, or, more commonly, this task is trusted to the specialized ministry. In these countries, the Ministry for Health must also cooperate with the responsible bodies in the procedures of policy making.

> For example in Cyprus, besides the Ministry of Health, the Planning Bureau is a semi-governmental body, which is responsible for the making and implementation of long-term strategies related to information society. In other listed countries, this role is trusted to following ministries: Ministry of Informatics (CZ), Ministry of Social Affairs (EE), Ministry of Transport, Post and Telecommunications, Section for Informatisation of Society (SK), Ministry of Investments, Industry and IT (MT) and Ministry of Interior and Administration (PL).

The advisor body can also be a coordinator of the activities in eHealth. However, in all EU10, except Estonia, the responsibility for the preparation of the eHealth policy is centralized in the Ministry of Health and its' departments. Also, there is a plurality of semi/independent state agencies and institutes, which are responsible for specific tasks, described in their statutory acts.

The local governments are partially involved in the development of eHealth, mainly in the task of the implementation of the eHealth policy and services on the local level.

> The emphasis on the inclusion of the local governments in the eHealth policy making and implementation of the policy and services was reported in all EU10, but with a special emphasis in Cyprus (Union of Cyprus Communities), Czech Republic (Association of Regions of the Czech Republic and Union of Towns and Municipalities of the Czech Republic), Hungary and Slovenia.

Since local governments have their own budget, they are able to invest in eHealth projects and encourage eHealth development on many other ways. However, in most EU10, eHealth projects are for the most part financed by the national government.

Research institutions, such as universities and public or semi-private research centres, are generally providing data, research and in some cases also specific services. These services are in most cases a result of specific projects, which were founded either from national, EU or other international ICT research and development funds.

> Tartu University Clinic (TUC) in Estonia started telemedicine projects in 1997, which has today enabled real-time video consultations and clinical conferences with other hospitals and family physicians. Since 2001, with the facilitation of the EU-funded Bitnet project, TUC's digital image archive is currently holding over 25 million units of digital images from different hospitals all over Estonia, forming the *de facto* standard for the country.

Health service providers, as part of their services, continue to be the main purchaser of eHealth services and implement several eHealth projects, which are financed from national or international sources. Institutions can finance such projects also from their own budgets for health service (for instance public health service providers in Slovenia). Such projects usually involve telemedicine (real-time video consultations and clinical conferences with other hospitals and family physicians), on-line

consultation and other. One example is, as mentioned, Slovenia where public health service providers allocate a part of their funds to developing e-health and for ICT equipment instead of health provision. The other is Lithuania where before the possibility to finance eHealth developments form EU funds, various eHealth initiatives have been funded mostly from budgets of healthcare institutions. And the third is Estonia where family doctors devote the biggest percent of cost in primary care to ICT.

### II.2.2 Division of roles and responsibilities in public sector

The division of the tasks and responsibilities among public actors in the eHealth field in EU10 is very complex and lacks overall coherence. The coordinative and implementation responsibilities are executed by variety of stakeholders, with their tasks many times overlapping creating responsibility and execution loopholes. The same is true for monitoring which is dispersed, deficient or performed by the same actors who are executing the monitored tasks.

The main roles and responsibilities among public actors in the eHealth field can be divided into the following four major categories: policy/strategy setting, coordination, implementation, monitoring and auditing.

#### II.2.2.1. Policy / strategy setting

In EU10, the strategies, policies and relevant action plans regarding health are generally prepared by the central governmental body, which prepares most of the health policies. This body is in most cases the Ministry of Health. However, the preparation of eHealth strategies doesn't follow this routine path. Due to the specific, ICT related topics, these documents are prepared in close collaboration with the professionals from the health and ICT field. Only in two countries, Lithuania and Latvia, all policy-making decisions are made solely within the Ministry of Health.

The collaborative ministries are those who are responsible either for information technology, informatics or state information system, electronic government, informatisation of society.

Within the Ministry of Health, specialized sub-bodies, such as committees, boards, councils, sections, departments, were formed to plan and manage eHealth policy development.

These sub-bodies, in most cases, employ highly specialized national eHealth experts, which can be also advisors to the minister or government.

Listed official bodies are involved in policy decision-making, but that is not their sole task. Due to the deficit of eHealth experts in countries, such bodies consist of majority of specialised professionals in eHealth field, who work in public administration. This results in highly specialised working units that besides policy deal with several other tasks of coordinatory and implementative nature. Also, due to the deficiency of the proper monitoring of eHealth development, also these tasks are many times transferred to such bodies.

To sum up, all EU10 countries established some sort of specialised body to face the challenges of eHealth policy-making. These official bodies are located either on Ministry of Health or on ICT related ministries. Their core role is in essence very dispersed, since there is serious lack of eHealth specialists in public administration. Consequently, bodies are responsible for the policy making and several other implementary and coordinative tasks.

#### II.2.2.2. Coordination

Coordination is currently (besides monitoring) one of the less advanced among four categories of roles.

Coordinating role is in most EU10 trusted to either Ministry of Health or to a specialized body, mentioned above. The problem with this sort of arrangement is that these bodies were formed for the policy decision-making. Politicians, professionals and scientist, who are highly qualified for policy-making, traditionally run them. Coordinating role is therefore rather enforced to them, since no other, managerial body, was formed, which would be dedicated specifically to the coordination.

> Only in Lithuania, the coordination is trusted (besides to Ministry of Health) to another public body, Information Society development Commission. This governmental body is a chief coordinating authority, which influences decisions on financing e-services. Besides that, the body is responsible for monitoring and assessment of eHealth and other eService projects. This body, however, is not coordinating specifically and only eHealth.

Altogether not much attention was dedicated to the formation of the proper authorities and bodies to carry out coordination tasks. Two options were present: either the countries decided that the separate authority was not needed or they felt that the ministries were successful in accomplishing those tasks.

II.2.2.3. Implementation

As an opposite of the coordinating category, implementation of the eHealth is institutionally more built-up, but also fragmented and dispersed.

The implementation of the eHealth strategies and policies is trusted to many public institutions. At first stage, some of the tasks are reserved for the ministries of health, ICT related ministries and specialised bodies mentioned above.

On the second stage, separate implementation authorities are in place in many EU10. These can be either national centres, departments within ministries, agencies or insurance authorities, etc.

Further, this task is dispersed to healthcare providing institutions in national and local levels, as for instance various central hospitals and clinics at national level and clinics and hospitals belonging to the municipalities.

Lastly, some authority is also transferred to the local governments, especially in Cyprus, Estonia, Lithuania, Latvia, Malta, Poland, Slovenia and Slovakia.

Altogether, implementation involves most of public institutions in all countries, which results in the absence of overall coherence.

II.2.2.4. Monitoring, auditing

A large number of EU10 does not have a single monitoring institution solely for the field of the eHealth development. In most countries the development is supervised by various authorities already in place.

Monitoring task can be trusted to the health ministry or ICT related ministry or specialised eHealth body mentioned before. Such institutional framework is at place in Czech Republic, Slovenia and Slovakia.

In few countries this authority is given to a separate ministry or body, which is not performing any other task in eHealth field.[40]

Related to that, there are specific fields, which are under supervision of separate authorities and they do monitor and audit eHealth only in relation to their areas. These specific fields are (with one example):

- Health information system standards and health statistics (National Centre of Health Information in Slovakia);
- Telecommunication services (The Cyprus Telecommunications Authority);
- Personal data protection (Office for Personal Data Protection in Czech Republic) and
- Public procurement (Polish Office of Public Procurement).

The consequence of such organisation is that some activities are very closely monitored by numerous authorities, and in some eHealth areas there is insufficient control. Audit and assurance of financial

[40] This is for example Information Society Development Commission in Hungary, Latvian Ministry of Welfare, National Information Society Council in Malta and Ministry of Finance in Slovakia.

matters is mostly trusted to the independent public institutions that supervise budget and have responsibility for auditing the management of public finances and state property.[41]

The division of the responsibilities for policy and strategy setting, coordination and implementation is summarised in the table below. The table clearly presents one of the most important weaknesses of eHealth policies in the EU10, the fragmentation of responsibilities. In such a disintegrated framework, it is difficult to set, coordinate and harmonise eHealth developments, which leads to low level of sustainability of eHealth projects.

[41] Overall, monitoring is a weak and under-developed category. In most cases, the general monitoring of eHealth development is carried out by the institutions that perform the tasks they are monitoring, such as policy-making, coordinating and implementing. Besides that, special monitoring authorities are in charge of several specific areas, which interconnect with eHealth field. However, neither first nor second solution is assuring proper level of monitoring over eHealth development.

**Table 4. The division of responsibilities among institutions in eHealth development in EU10**

| Country | Policy&Strategy | Coordination | Implementation | Monitoring |
|---|---|---|---|---|
| **Cyprus (CY)** | - Cyprus Planning Bureau<br>- Ministry of Health, Department of Information Technology on Policy Issues<br>- Union of Cyprus Communities | - Ministry of Health<br>- - Ministry of Finance, Directorate for the Coordination of the Computerisation of the Public Service | - Ministry of Finance, Department of Information Technology Services<br>- local governments<br>- healthcare providing institutions | - Ministry of Finance, Directorate for the Coordination of the Computerisation of the Public Service<br>- Ministry of Health |
| **Czech R. (CZ)** | - Ministry of Health, Department of Informatics<br>- Ministry of Informatics<br>- Association of Regions of the Czech Republic<br>- Union of Towns and Municipalities of the Czech Republic | - Ministry of Informatics<br>- Ministry of Health, Department of Informatics | - Ministry of Health<br>- Ministry of Informatics | - Ministry of Informatics |
| **Estonia (EE)** | - Ministry of Social Affairs<br>- Ministry of Economic Affairs and Communication, Department of State Information System | - Ministry of Economic Affairs and Communication, Department of State Information System | - Estonian Informatics Centre<br>- Ministry of Social Affairs<br>- Estonian Health Insurance Fund<br>- local governments | - State Audit office |
| **Hungary (HU)** | - Ministry of Health, Electronic Government Centre | - Ministry of Health, Electronic Government Centre | - National Health Insurance Fund Administration<br>- Clinics and hospitals on national level and those belonging to the municipalities | - Hungarian State Audit Office |
| **Lithuania (LT)** | - Ministry of Healthcare | - Ministry of Healthcare<br>- Information Society Development Commission | - healthcare institutions<br>- local governments | - Information Society Development Commission |
| **Latvia (LV)** | - Ministry of Health | - Ministry of Health | - State Agency of Compulsory Health Insurance<br>- Agency for Health Statistics and Medical Technology<br>- State Agency for Pharmaceuticals and Drugs<br>- various healthcare providing institutions at all level<br>- municipalities | - Ministry of Health<br>- Ministry of Welfare |
| **Malta (MT)** | - Ministry of Health, the Elderly and Community Care<br>- Ministry for Investments, Industry and IT | - Ministry for Investments, Industry and IT | - various healthcare providing institutions at all level<br>- local governments | - National Information Society Council |
| **Poland (PL)** | - Ministry of Health<br>- Ministry of Interior and Administration | - Ministry of Health<br>- Centre of Information Systems of Healthcare | - National health found<br>- Polish social insurance institution<br>- healthcare providing institutions at all level<br>- local governments | - Centre of Information Systems of Healthcare |
| **Slovenia (SI)** | - Ministry of Health, Health Informatics Council<br>- The Health Council | - Ministry of Health, Health Informatics Council | - Health Insurance Institute<br>- Institute for Public Health<br>- healthcare delivery institutions<br>- local governments | - Ministry of Health |
| **Slovakia (SK)** | - Ministry of Health, eHealth Committee<br>- Ministry of Transport, Posts and Telecommunications, Section for Informatisation of society | - Ministry of Health | - National Centre for Health information, Slovak eHealth Competence Centre<br>- healthcare providing institutions<br>- local governments | - Ministry of Health<br>- Ministry of Finance |

Source: Country reports

### II.2.3 Financing structure of the government and other public bodies in eHealth

The central government budgets in the EU10 finance the majority of the government institutions, with some own revenues covering part of their expenditures. The state budgets cover operative costs of the public institutions and expenses of majority of the projects related to eHealth. A special case is Lithuania, where government has so far not allocated much of the budget of the state to development of eHealth, and some financing has come from municipalities, while the majority from World Bank loan. Another case is Poland, where there is strong regional activity in receiving EU funds for eHealth.

Some institutions are also partially financed by the European Union, but this is, in most EU10, only for covering the costs of particular eHealth projects. The co-financing from the EU is either from structural funds or from other funds which support projects aimed at developing eHealth. Latvia is an exception since it managed to take good advantage of European funds that are the second largest source of funding for eHealth in the country and the government has already made plan for future exploitation of the European structural funds.

Support was also received from the World Bank. Slovakia has received a World Bank loan EUR 2.39 million for an eHealth project and a Japanese PHRD grant.[42] In Estonia National Health Informatisation system was co-financed by World Bank and in Hungary Hospital Management Information Support was funded by the World Bank. Slovenia reports a project partially financed by the World Bank. It is suggested from Lithuanian report that World Bank funding is actually the biggest investment in eHealth in the country. Poland also mentions Norwegian Financial mechanism that will also fund some eHealth projects in EU10. The Czech Republic reports on health insurance companies allocating their sources to development of eHealth projects and provisions.

The exact amount of the expenses for the eHealth projects is regrettably very hard to calculate, since the money, that comes from the state budget can be either:

- Allocated directly to the institutions for a particular project (usually for bigger projects),
- Allocated directly to the public institutions for their operational expenses and institutions further allocate money to the eHealth projects (for example money for health services, which is in hospitals in EU10 may times partially used for the development of the eHealth) and
- Allocated to the ministry or several ministries (this is the Ministry of Health in majority EU10, which prepares public calls for eHealth projects).

Therefore, only few countries can precisely define an exact amount of budgetary expenses for the development of eHealth. Latvia cites 87 000 EUR spent on eHealth development in 2004, 261 000 EUR in 2005 and 87 000 EUR in 2006. In Slovenia the sums are quite large: in 2004 17.8 million EUR were spent on eHealth. The new strategy eHealth 2010 in Slovenia envisages increased investments in eHealth - the investment of 2.33 million EUR in the year 2006 and an increase of 50% on annual level to be provided for following years at the national level.

### II.2.4 Business participation in eHealth financing

Private sector participates in eHealth service provision in very limited scope and roles. The private sector is participating in the eHealth development with following activities:

- Provision of expert advise concerning strategies, action plans, legislation;
- Technical services, maintenance services for hardware and software packages for all government bodies and
- Implementation, maintenance and operational support for eHealth services

The business sector plays active role in some areas of the implementation of eServices (equipment leasing, maintenance and operational support), while private companies rarely participate or have an

[42] Japanese Policy and Human Resources Development Grant was established in 1990 and is currently one of the World Bank's largest source of grant funds available to borrower countries.

important place in the decision-making concerning eHealth development. An exception is Latvia, where a business service firm has been contracted by the Ministry of eHealth to produce an eHealth development strategy. There is a similar case in Poland but on regional level – private association prepared eHealth strategy for the Lodz region 2007-2013.

The involvement of the private sector in such actions is only on a project contract base, which limits its involvement in responsibilities, such as financial risks and long term sustainability of eServices provision. The private sector includes a number of IT medium and small sized companies. NGOs are very limited involved in the provision of eServices. Their role is mostly in the uptake of eServices solutions into their operation.

The IT industry plays an important role in the lobbying for eHealth. The SMEs closely follow issued tenders, action plans, strategies and policies. They are also very active in informal conferences, official meetings between business sector and government, technology networks or platforms, etc. All these activities open opportunities for collaboration with the Government. In most countries, private public partnership in eHealth is strongly dependent of the legislation and procedures related to public procurement and private public partnerships. These procedures are in some countries very complicated and limiting. Therefore it is suggested that most of EU10 very limited or non-existent private public partnerships. In Slovakia, Czech Republic, Cyprus and Lithuania there are almost no PPP. Latvia is quite the opposite.

> The design and development of ICT systems in the public sector in Latvia has for many years relied on public private partnerships because the state institutions out-sourced system design, development and implementation to the private sector – ICT firms. In many cases, appropriate off-the-shelf systems or software were not available and local ICT skills in the private sector were of good quality so new and specific systems were developed. The key factor is quality control from the responsible government agency to ensure that the contracted service satisfies the required quality standards and does not conflict with the policy objectives.

The Public Procurement laws and especially public procurement practices in EU10 generally do not promote strategic partnerships and long term relationships between the public and the private sector. With the exception of some countries which have relatively recent laws on PPP.[43] These results in rather complicated and very time consuming tender evaluations and other procedure related to tenders, which results in less effective public administration. (In Slovenia, for example, the selection procedure of an appropriate private sector implementer for the Healthcare Information Support (HCIS) System started in 2004 and has been completed two years later in 2006 causing considerable delays in the implementation of the project).

Governmental bodies dealing with eHealth on the operational basis (for example Department of Information Technologies in Cyprus), are in EU10 usually responsible for the procurement procedures. The public procurement of services is carried out through the issuance of Request for Proposal (RFP) for such services. The selection procedure for an appropriate proposal is based on a technical and financial evaluation.

### II.2.5 Policies and strategies in relation to eHealth

Policies that directly address the development of eHealth are in basically all EU10 of a rather newer date. The development of key documents started with the preparation of a national eHealth strategy in all EU10. Poland, Czech, Malta and Estonia are the only ones that have not yet officially adopted eHealth strategies. Most reported that strategies follow EU guidelines for the eHealth development. In some countries action plans were prepared simultaneously (for instance Slovak eHealth National Strategy (Road map) and the Slovak eHealth Action Plan and also Latvian eHealth Action Plan and Hungarian Activity Plan of the eHealth Programme of the Hungarian Information Society Strategy), while in other countries action plans are in preparation. However, there are some cases where eHealth projects are being prepared independently and are not presented within eHealth action plans. As the Table 5 shows there is some activity in almost each country (e.g. Slovenian government presented in

[43] Poland: in October 2005 a law on participation of private institutions in public investments came into force.

July 2006 a Resolution on the National Development Projects, which also focused on the eHealth projects).

**Table 5. Important strategies, policies, action plans and projects related to eHealth in EU10**

| Country | Strategies | Important Policies | Action Plan | Projects |
|---|---|---|---|---|
| **Cyprus (CY)** | - eHealth strategy | Related policy:<br>- The Cyprus Strategic development Plan | | - Healthcare Information Support System<br>- Health Monitoring System |
| **Czech R. (CZ)** | Related strategies:<br>- Healthcare Reform for the Czech Republic in the 21st century Europe<br>- e-Czech 2006<br>- National Information Security Strategy of the CR | Related policies:<br>- State Information Policy: The Road to an Information Society<br>- National Telecommunications Policy<br>State Information and Communications Policy | | - Portal.gov.cz<br>- The registrar of "Non-physician Professions"<br>- Integration of Registrars of Healthcare Professionals<br>- Establishment of Public Health Financial Management System<br>- Improvement in the Healthcare Management System<br>- Project Netcards<br>- Internet Access to Patient's Healthcare Information |
| **Estonia (EE)** | Related strategies:<br>- Estonian Health Project 2015 | Related policies:<br>- Draft of Estonian Health Information System Development Plan 2005-2008<br>- Estonian success 2014<br>- Principles of Estonian Information Policy 2004-2006 | | - Estonian Health Insurance Fund – online insurance services, eCitizen portal<br>- Hospital Informatisation System<br>- National Health Information System |
| **Hungary (HU)** | - eHealth Strategy<br>Related strategies:<br>- Healthcare and Social Strategy of Hungarian information Society<br>- Hungarian Information Society Strategy | - eHealth Programme<br>Related policy:<br>- Government healthcare Programme | - Activity Plan of the eHealth Programme of the Hungarian Information Society Strategy<br>Related Action Plans:<br>- Human Resource Operational Programme of the National Development Strategy | |
| **Lithuania (LT)** | - The eHealth Strategy 2005-2010<br>- Development of the Social and economic infrastructure, restructuring and upgrading of Healthcare Institutions in Single Programming Document for 2004-2006 EU funds<br><br>Related Strategies:<br>- Long-Term development Strategy of the State<br>- Long-Term Economic Development Strategy of Lithuania until 2015 | Related policies:<br>- Strategic guidelines for information society development<br>- Program for Information Society Development in Lithuania 2006-2008 | Related Action Plans:<br>- Action Plan for the Implementation of the Programme of the Government 2001-2004 | - State patient Fund IS Sveidra<br>- Pilot project on the development of the national core of the eHealth system<br>- eHealth project<br>- The National Computerisation Plan<br>- eHealth Action Plan<br>- eHealth development programme in Vilnius city<br>- Pilot project "Patient Visit Reservation System" development<br>- ICT implementation and development in Vilnius University Emergency care hospital<br>- The project on eAmbulatory healthcare system development and implementation in primary healthcare institutions of Vilnius city<br>- The project on the development of IS for the State Medicine control Agency<br>- eHealth System Preparation and Implementation in the Healthcare Sector. |

| | | | | |
|---|---|---|---|---|
| **Latvia (LV)** | - eHealth strategy<br>Related strategy:<br>- eLatvija until 2008 | | - eHealth Action Plan<br>- Public Health Strategy Action Plan | - Informatisation of State Blood Donor centre<br>- National Emergency Response Centre<br>- Database of Handicapped Persons and information system of handicapped<br>- Emergency Medicine Centres I Systems<br>- Baltic International Telemedicine Network |
| **Malta (MT)** | - Draft eHealth Strategy<br>Related strategy:<br>- National ICT Strategy | Related policy:<br>- National Strategic Reference Framework 2007-2013 | Related action plan:<br>- Hello IT | |
| **Poland (PL)** | - Currently the only official strategy is regional – The eHealth strategy for the Lodz Region for the years 2007-2013.<br>- The eHealth Strategy for Poland for the Years 2004-2006 – is not binding thus cannot be treated as formal strategy<br>Related strategies:<br>- The strategy for Information Technology Development in Poland until 2013<br>- The National Cohesion Strategy for 2007-2013<br>- The Strategy of the Development of Healthcare 2007-2013<br>- ePoland – the Action Plan for Development of Information Society in the Years 2004-2006 | | - The National Computerisation Plan | |
| **Slovenia (SI)** | - eHealth 2010 | | | -Introducing computer exchange of information<br>- Standards definition<br>- Establishment of databases<br>- Implementing the health insurance card |
| **Slovakia (SK)** | - Strategy of Development of Health Informatics<br>Related strategy:<br>- Slovakia Lisbon Strategy | - The Slovak eHealth National Strategy<br>- Strategy for the Development of Information Society | - Slovak eHealth Action Plan<br>- Action Plan for the Development of Information Society | - Development of Health Management Information Systems (World Bank)<br>- Operating Program Informatisation of Society<br>- Japanese PHRD grant project no. TF 026121<br>- Phare project "Strengthening of statistics health information system and harmonisation with EU requirements |

Related strategies, policies and action plans in the above table are the ones that have an indirect influence on the development of eHealth in the respective countries (e.g. general ICT strategies and policies).

### II.2.6 Supporting legislative acts

The regulatory base for the implementation of the main eHealth policies in EU10 extends to the following fields:

- Legislation related to data protection (personal data protection and protection of the

databases).These acts are regulating protection of extremely sensitive data related to people's health. The law makes it compulsory to unconditionally protect personal data as much as possible. Such acts are in place in all EU10. Due to the fact, that their nature is very rigid, they are a barrier to the development of some eHealth services in Slovenia and Slovakia. This, however, is due to the late adjustment of the law to the electronic services.

- Legislation related to the health services. These types of legal acts ensure patient the right of access to health documentation which relates to their state of health.
- Legislation related to the medicine, pharmacies and health insurance.
- Legislation related to public private partnerships and public procurement.

Only Estonia and Poland report a favourable and supportive legislative environment toward ICT. The other countries report legal framework as incomplete, inefficiently implemented, presenting a barrier for eServices development and implementation, etc.

> In Estonia there is a very important supportive regulation in terms of computerisation of general practitioners as the possession of computer and Internet access was a prerequisite to get one's premises licensed since 2001. In the country the legislation was adopted without EU pressure and we can observe the political flexibility in this matters since there have been several amendments introduced to facilitate the development of eHealth applications.
>
> Poland also has a somewhat specific situation with the Act on Informatisation of Entities Providing Public Acts (AIEPPA) that came into force in 2005 and is the first act of its kind in that part of Europe. It establishes minimal technical requirements for computerization of public bodies, which also goes for public healthcare institutions. The Act sets up minimal standards for public information systems, public registries and exchange of information in public sector. It obliges all public bodies including public healthcare institutions to enable electronic communication with other public institutions.

Especially Cyprus, Lithuania, Hungary, Malta report gaps in legislation adoption. The countries have problems with missing laws on patient databases, reimbursement laws, standards legislation, and lack of compulsory legislation forcing application of eServices. Slovenia and Slovakia report problems in private-public-partnerships in eHealth and public procurement framework that are not adequate which causes vast delays, inefficiency and slow procedures. Slovakia also reports an adequate but not stimulative legislative system, which is obviously an important factor to consider for development of eHealth.

### II.2.7 International best practices, proposals and suggestions by the European Union, incorporated in the national policies

PHARE and World Bank projects have had strong influences in the countries, where they have been implemented by setting standards, building standardized role of state in health domain, providing regulations and harmonisation with EU requirements.

> From 2003 when World Bank sponsored reform created the State Agency for Compulsory Health Insurance, up until 2005 there were practically no other centralised eHealth development activities on a national level in Latvia. In 1997 the Welfare Ministry together with World Bank consultants created a "Healthcare Reform" plan and Latvia signed an agreement with the World Bank for a dedicated loan and project implementation that present a foundation for eHealth development in the country.

As we will see from the following, European strategies and best practices have in great extent influenced the development of EU10 policies as is clearly obvious also from the names and years of adoption of specific strategies and Action Plans.

The Slovak eHealth Action Plan itself is based on assessment of current state of eHealth and analysis of future trends especially in EU countries. The document incorporates all relevant eHealth documents

of the European Union. In Latvia also development work on policy concerning eHealth is based on international best practices, mostly EU Member States. Cyprus took into consideration Action Plan for a European eHealth Area, which was also the basis for Slovenian eHealth strategy.

In Slovenian policy one can observe the influence of European i2010 initiative. In Poland i2010 has been embedded in National computerisation plan. And in general the main assumptions of the European policies were transported into national strategies. Hungary also took into consideration i2010 and eEurope and adapted it to the national circumstances; international best practice studies have been less influential. Lithuania performed a detailed analysis of EU countries regarding utilisation, recommendations, practical experience and market review in the field of eHealth, and established the list of countries, which can serve as useful models as Denmark, UK, Greece, Switzerland, Italy and Sweden.

## II.3. Achievements and shortcomings of eHealth

The achievements and shortcomings of eHealth developments are assessed in a similar structure focusing on services, basic infrastructure, related policies and effects of eHealth developments.

### Achievements in eHealth

**eHealth services.** Compared to the first half of the decade, there is **increase in number of healthcare institutions**, which already provide eHealth services. These include both private and public healthcare units, starting from general practitioners to hospitals: there are new eHealth service providers, while the traditional healthcare institutions provide more eHealth services. The scope of available services and service providers has increased in recent years, the awareness of eHealth benefits has been increasing among health providers and increasing number of them is willing to invest in this area.

As an outcome there is an increase in the pool of information provided by these institutions, as the countries have made significant efforts and spent sizeable budgets on the presentation and dissemination of information on eHealth.

> As an example in Slovakia one of the biggest booms in eServices is related to different portals. These portals usually represent private initiatives that fill-in the gap on the supply side, but at the same time the Ministry of Health has started an official portal www.zdravie.sk that provides besides health related information full texts of relevant laws and contacts to different institutions.

The broader **pool of available information** has been accompanied by the increase in number of pilot projects, including establishment of appropriate databases, development of electronic health records, integrating various stakeholders.

An example of pilot projects is the START project in Silesia region (Poland), which represents one of the successful, large-scale implementations of electronic service record system. Within the projects, over 100 million medical treatments are authorised electronically, 5000 healthcare providers settle everyday contracts with the National Health Fund and 20 millions of recipes are prescribed annually based on the issuance of around 5 million health cards.

Closely related to the growing pool of available information, more people become aware on the positive impact of eServices and there is a **growing demand for eHealth**.

**eHealth infrastructure.** Another achievement has been the supply of healthcare institutions with **basic infrastructure** needed for eHealth services. This has been related to personal computers, Internet access and broadband connections, integrating internal financial and accounting, administrative procedures inside the healthcare units and between them and the insurance funds. Notwithstanding the financing constraints in relation to both healthcare and ICT related expenditures in the public institutions, their supply with basic infrastructure was regarded as a policy priority in the EU10.

> For example in Estonia, ICTs were early and broadly introduced by each general practitioner, though it mainly remained as a tool for financial and statistical data management. In Lithuania in 2005 the share of healthcare institutions having PCs was 94%, having Internet access 91 %, having ISDN connection 25.4%

**eHealth policies.** There has been an increasing importance attached by policy makers to this domain as the potential allowed by eHealth in solving the healthcare problems was recognised. In that respect the awareness raised both by the European Commission and other international sources had their impact. This is visible in the preparation of national and in geographically bigger countries regional eHealth strategies, in the inclusion of eHealth related elements to information policy priorities and strategies, in the priority given to eHealth among health sector measures.

> An example of regional eHealth strategy is Lodz in Poland, which started to develop its eHealth strategy for the years 2007-2013, which includes a list of eServices for implementation to be developed. The implementation of the strategy is supported by the Structural Funds, via Regional Operational Programme for the years 2007-2013.

There is **growing spending** by authorities on eHealth related developments. This trend is to be strengthened further by the expected inflow of development funds from the European Union as the countries have separated eHealth related projects in their Operative Programs. One of the key goals of these Ops is to increase the number of eHealth services.

> In Cyprus, the government laid down specific goals in the Cyprus National Strategy for the Information Society for 2004-2006: the creation of new eServices of high added value including the provision of broadband services in both urban and rural areas.

Besides the national and EU funds, other sources are used to fund eHealth. In Slovakia the assistance of the World Bank had significant importance for eHealth development as the Bank assisted in the comprehensive sector restructuring, and highlighted the importance of ICT issues in eHealth.

**Shortcomings in eHealth**

**eHealth services.** According to the results of the country studies, the **scope of eHealth services** is much more **limited** in the EU10 than in the rest of Europe. The number of eHealth related services remains – with the exception of Slovenia and Estonia - lower than in the EU15, most of the countries are at initial stage of using ICT applications in the health sector, and the implementation of eHealth solutions progresses slowly.

Besides the number of health related services available online, the level of interaction between the suppliers and users is low: while as an advantage ICTs have been used mainly in therapeutic treatments, their usage remained limited in the interaction of patients and doctors, or among various healthcare professionals, in the provision of information and in the simplification of data recording, administration.

**eHealth infrastructure. The quality and availability of ICT infrastructure** is low and very unbalanced, with significant gaps among healthcare institutions. Weak physical infrastructure is linked to the weak financial background of healthcare institutions. Overall, the level of PC and Internet penetration is still much lower than in the EU15, the access of institutions to broadband connections and other up-to date technology is unbalanced,

> For example Lithuania, ranked overall high in many eHealth indicators, has very weak infrastructure data: there are only 9 personal computers at healthcare institutions per 100 employees, and only 7 personal computers with Internet access. The share of healthcare institutions' employees working with computers was in 2005 only 18.5%, of the employees of healthcare institutions using the Internet only 15.3%, of healthcare institutions with Internet website 25.4%. As a result the share of persons using the Internet for making an appointment online with the practitioner was only 0.8%

Besides the deficiencies in physical infrastructure, there are shortcomings in human resources as well. Despite the overall favourable education attainment, physicians are unaware of available technology

and its relevance for their profession, most of the eHealth applications are used mainly for management purpose and improving the information flow within a single institution, lacking broader perspective. Knowledge of ICT and eSkills is low, Internet penetration among physicians is low, and sometimes there are problems even with access of doctors to PCs. An additional difficulty is the weak incentive for general practitioners to improve their services, as they are generally paid by insurance companies on the basis of the number of patients they treat.

In most of the EU10 eHealth developments by individual healthcare units were uncoordinated (being developed in parallel by various companies or in-house IT-departments of healthcare institutions), resulting in **limited interoperability of systems**. The markets have remained scattered, because of their small size and volatile policy environment prohibiting the realisation of economies of scale.

> In Poland the low level of medical standards results in the lack of interoperability of health information systems, which are not being operated as a part of a general, nationwide system. As a result the presence of applications enabling seamless data exchange, digital imagining exchange and data gathering applications is infrequent.

Lack of interoperability is also due to the asymmetric power level of local administrations and companies supplying IT solutions. For example, in many countries the aim of the ICT companies' to maximise sales of their own technology has coincided with the goal of the healthcare institutions to act independently of each other in their purchase and development of ICT hardware. As a consequence, each (public) authority has introduced its own unique IT system and infrastructure despite the availability of equivalent solution at other public institutions. Besides problems of interoperability, this has resulted in waste of resources, costly solutions for public healthcare institutions, lower market competition among the service providers.

**eHealth policies.** The low level of attention devoted to eHealth is another problem: these policies have only recently beginning to receive the appropriate level of attention. While most of the EU10 countries have started to draft appropriate eHealth policies, they have so far been unable to formulate forward-looking and comprehensive eHealth strategies. This was true even for those countries, which initiated ambitious health reform programs. For example, there was no eHealth related policy in the Slovak Republic three years ago at the beginning of the healthcare reforms and policy makers were focusing solely on vital functions of the Slovak healthcare system (indebtedness, institutional reorganisation, new financing models and rules etc.). The implementation of eHealth actions, which arise from the general National eStrategy, was thus postponed for some years.

In many of the EU10 the political support to eHealth has remained at rhetoric level: there is no approved strategic document for national health or health information policy and eHealth development is shaded by eGovernment priorities.

> For example, at the time of writing this report there is no document in Lithuania on eHealth policy at national level and eHealth is driven by eGovernment priorities. This impedes eHealth development and opens space for local non-coordinated activities.
> Similar to Lithuania, Poland still does not have the national strategy for eHealth, regardless of the previous commitments and the EU recommendation. The draft of "eHealth Strategy for Poland" developed in 2004 has never been formally adopted constituting an internal document of the Ministry of Health.

Overall governments devoted more attention to eGovernment and eLearning developments among public eServices. At the same time healthcare reforms have mainly focused at institutional, regulatory and financing issues rather than the development of online healthcare applications. With the exception of Lithuania and Latvia, the institutional responsibilities over eHealth are scattered.[44] As a result in

[44] See description in the previous chapter.

most countries there is no committed "owner" of eHealth policy responsible for its implementation and the collaboration and coordination among the different stakeholders is weak.[45]

Another policy related shortcoming of eHealth is the **limited amount of available funding**, which is the reflection of the priority attached to eHealth as well as of the financial position of healthcare institutions. At the same time, the limited public funding is used inefficiently, while the contribution of the private sector has been either constrained or in the form of gratitude money, which is not a source of investments. The uncertain and volatile regulatory framework and policy priorities prevented the private sector to enter more significantly both the funding and provision of eHealth applications.

The lack of financing may be overcome in the following years by the growing inflow of Structural Funds. Many countries have included to their Operative Programs healthcare priorities and, among the programs funding healthcare, several are related to eHealth applications.

However, there is a **major problem with the use of** these **EU funds** as the main focus is their absorption instead the outcome and quality of projects. This is not an eHealth specific problem, but generally the majority of the NMS gave preference to absorption consideration neglecting somewhat efficiency by investing them in high return projects. This approach should be changed between 2007-2013, when several times more funds will be absorbed by the EU10 countries.

> In Lithuania currently, the focus is placed mostly on absorption of funds allocated for eHealth but not on the quality of projects. The Ministry of Health, responsible for the implementation of eHealth, is not represented in the eHealth project assessment.

A final shortcoming of financing eHealth in the EU10 is the lack of a sustainable financial model for eHealth and of successful cases of public-private partnerships (PPPs). The lack of sustainable financial model coupled with the absence of PPPs significantly reduces the scope for funding eHealth. The ambiguous role and poor policy by the state has prevented both providers and private capital from investing more on ICTs.

**eHealth effects.** The **impact evaluation of existing eHealth solutions** is missing, which is mainly due to the lack of appropriate skills and methodologies as well as stakeholders carrying out these assessments. Neither public authorities, nor the public or private service providers have been interested so far in carrying out monitoring exercises, in measuring costs and benefits of eHealth. This is a significant problem as the lack of assessment hides both the existing weaknesses of implemented projects and it prevents policymakers, users and service providers from thinking on further areas of eHealth applications.

A further shortcoming is that so far **eHealth has been more oriented to administration purposes** of healthcare institutions than to population needs. In the health systems ICTs have mostly been used as a tool for data transfer without business process innovation. As a result, there have been few eHealth projects improving quality, access and/or integration of health services, at least on national scale.

[45] Moreover, the major stakeholders and supporters of eHealth developments have scarce staff and their voice within the government remains weak.

# III. FACTORS, DRIVERS, BARRIERS AND CHALLENGES FOR THE DEVELOPMENT OF E-HEALTH[46]

## III.1. Major factors that affected the evolution of eHealth

Based on the evidence from the Country Reports, the evolution of eHealth in the EU10 has been driven by economic, policy and healthcare related factors.

### Economic factors

The major economic factor affecting indirectly eHealth developments has been the rapid **economic growth and income convergence.** The EU10 has been showing fast income growth in the last decade driven by market oriented reforms and macroeconomic policies influenced by the needs of convergence and coping with competitive pressures within the European Union. The average per capita real GDP growth for the EU10 countries reached almost 5% in 2000-2005, and exceeded by 2-3 times the average rate of GDP growth in rest of Europe. As a result of fast growth and appreciating exchange rates, these countries have been able to close part of their income gap vis-à-vis rest of Europe both in terms of actual and equilibrium exchange rates. The rapid growth in the economy leads to the increase in disposable incomes, coupled with the deregulation of the telecoms sector allowing for the greater affordability of ICTs, resulting in increased use of ICTs for health.

While fast, economic growth has generally been fragile: both exogenous shocks (currency crises of the late 1990s, the spill-over effect of the Balkan war and the recent EU slowdown) and internal problems (inconsistent monetary and fiscal policies, costly restructuring, corporate and banking sector consolidation, reversals in structural reforms, etc.) made GDP growth volatile. The most vivid examples have been Slovakia (1999, currency crisis and subsequent restrictive macroeconomic policies), Poland (restrictive monetary and lax fiscal policy for disinflation from 2000 onwards), Hungary (lax fiscal and incomes policies between 2002 and 2005, followed by severe adjustment package from mid 2006).

Fast economic growth leading to the rise of disposable incomes, and improving regulatory framework have resulted in the decline of access costs, improving affordability of ICTs. Though it remains still lower than in the EU15, average ICT spending in GDP has increased in the EU10 in the last decade. Altogether, fast GDP growth has created the precondition for investment decisions in the area of ICT and eServices by business and public sectors. High economic growth has enhanced attractiveness of these countries for foreign investors, prevented large emigration, including of IT specialists, and gave room for increased state spending on education, infrastructure, and modernisation of public administration.

In general GDP growth, disposable incomes and resulting expenditure patterns[47] are only some of the factors influencing ICT developments and spending patterns. Further explanatory variables should be incorporated when considering the special, different from the overall trend cases. These include among others ICT related public policies, institutional developments and the level of competition in the economy, the level of human capital in general and ICT skills or digital literacy in particular.

> Estonia's position (low GDP per capita level / high ICT developments), the comparatively low ICT related spending in Slovenia notwithstanding its highest income level among the New Member States, or on the contrary the high level of ICT expenditures in Slovakia.

Almost all of the EU10, excluding Cyprus and Malta, has been characterized by **strong and persistent regional, income and related digital divides**. Income dispersion is generally more important than in the EU15 and income gaps have widened since the last decade. Economic transformation benefited in recent years mostly larger and more advanced regions. Lower financial

[46] Factors are those developments that have influenced the changes in eHealth in the past. Emerging drivers and barriers reflect those developments, which are currently influencing the evolution of eHealth and which are expected to do so in the short- to medium-term future. Thus, contrary to the factors explaining past developments, the drivers and barriers are observed today and are expected to have their impact in the future.

[47] The share of GDP on ICT expenditure is higher in countries with higher GDP

expenditures and investments for smaller regions or with collapsing industries have led to their downgrading. This has resulted in lower access to ICT infrastructure, inadequate transport and technological infrastructure, worsening quality of education systems and level of provision of healthcare services.

> Along with economic transformation and growth during the 1990s, regional and social disparities in Poland became increasingly evident. The policies aiming at reducing the above mentioned inequalities have brought little impact in real terms. In total, the backward regions in Poland comprise 34.1% of the population and around 30% of the country's territory (2003).

Besides income inequalities, greater social divides are reflected in the labour market patterns. Besides being generally higher than the EU15 averages, unemployment is a structural phenomenon, long-term unemployment is persistent, while employment levels remain low. Employment driven income differences lead to differences in access to opportunities, which affect the use of ICT services.

Economic growth and new investments also shape **geographical disparities** as regions with adequate public infrastructure supply and new private investments generally outperform those that lack such assets. This leads to a vicious circle as regions with better infrastructure tend to attract more capital, more flexible and qualified labour, which feeds back to new domestic and foreign investments, while the laggards generally accumulate the disadvantages. As a result, the last twenty years has shown significant migration from rural to urban areas (especially by young and adult people in working age) due to better access to educational institutions and labour markets.

The large regional disparities in GDP per capita are closely correlated with ICT penetration, poor "hard" infrastructure in the lagging regions and regions of large agricultural employment, which limits interest in the uptake of ICT skills. The income divide brings a weak presence of middle classes, which would - if they were stronger - serve the base of the demand for eServices.

#### Policy-related factors

One important policy related factor affecting the evolution of eHealth has been the **low level of healthcare expenditure and under utilisation of EU funds for health.** In 2004 the average of the healthcare expenditures to GDP was slightly above 9 % in the EU15, and slightly below 7 % in the EU10.

> One explanation in Estonia of the low financial commitments towards ICT in health sector is the overall low share of health expenditures, reaching 5.3% of GDP in 2005. This is aggravated by pressures to increase salaries and the low level of capital investments in the health sector.

Funds available for health spending were enlarged in the recent years by the inflow of funds from the European Union. While most of the funds were absorbed by the recipient countries, the efficiency of the utilisation of allocated EU funds in the last years was low. This was due to the lack of awareness about related procedures of requesting and investing these funds, and to the absence of appropriate institutional structures. Thus so far these funds could alter only slightly the scope of available spending on health and eHealth.

The **reform of the healthcare sector** has been one of the main factors affecting eHealth. These reforms included the change in the financing model of healthcare services, the institutional structures providing healthcare services, the ownership of health service providers. All these elements were linked to eHealth: in the early years of transition the reforms were proposed without giving due consideration to the impact eHealth may have on the reforms, while in recent years this consideration received much higher importance.

A main driving force behind **Estonian** health reforms has been efficiency – strict budget control and a lot of decentralised autonomy. It is not surprising then that the EHIF (Estonian Health Insurance Fund) as the single major paying agency and the main public 'tool' to achieve efficiency has also been very powerful in guiding the ICT development of providers. Through its contracting power EHIF has become the *de facto* ICT standard-setter.

Decentralised and autonomous provider network, plus financial motivation by main purchaser (EHIF) within a relatively stable environment, has promoted the development of individual (though incremental) eHealth solutions by all providers even after the failure of the centrally-developed and government-funded EMR development project.

In most of the EU10 reforms and changes in regulation have played an important role in the development of eHealth. The healthcare reforms focused on allocating more resources in the sector, creating or improving better insurance models, consolidating the institutional framework, reducing the mismatch between demanded and supplied healthcare services and reinforcing the involvement of the private sector in healthcare provision and health sector financing. As these reforms are costly, politically risky, hurt significant vested interests and the distribution of their costs and benefits is asymmetric, the reforms have been progressing slowly, facing a number of implementation obstacles. While the reform process itself failed to utilise the advantages given by eHealth for the modernisation of health services, the slow progress with reforms weakened the incentives for the development of eHealth.

Microeconomic factors have also affected the evolution of eHealth: an increasing need for greater integration across healthcare service providers, a growing number of private providers and thus rising competition, particularly among primary healthcare providers (which stimulates the demand for efficient services) were the major drivers behind this. Consolidation of services and mergers of hospitals, appearance of new medical technologies are trends, which also stimulate application of ICT.

**The contribution of government policies**

ICT services related public policies can be divided to direct and indirect ones. Direct policies affect primarily the development of ICT services, such as awareness raising actions, measures supporting access to ICT infrastructure, direct government spending and programmes on ICT services. The indirect policies influence ICT developments by improving the framework conditions including such vital areas as telecom privatisation, regulation and competition policies, taxation schemes and investment promotion, R&D and education policies. While direct policies have mainly their effect on the demand side, indirect ones influence the supply side.

In both areas one can find weaknesses on the policies. In case of direct policies governments spent small portions of their budgets on ICT services, devoted limited attention to awareness raising actions, while they have generally been very supportive for access to ICT infrastructure. Among the indirect policy measures, the hesitation with introducing ICT services related regulations, like Digital Signatures and eProcurement, slowed down the spread of these services.

These weaknesses have generally reduced the take-up of IS services in the EU10, weakened the growth of demand for ICTs among users, and slowed down the emergence of new services.

Besides the ICT related policies, there is an additional difficulty with eHealth policies in the EU10. They are mostly defined as pillars of specific Information Society strategies and are not tailored to the structure and needs of the countries. As a result, even though at definition level these policies are supportive, at implementation level they come across a number of country specific obstacles. For example even though healthcare reform was identified by most of the EU10 countries as a tool to improve healthcare service provision, the implementation of such reforms has been progressing very slowly.

#### Health-related factors

A main health related factor has been the **increase in the quality and availability of basic ICT infrastructure.** The analysed countries have spent in recent years increasing share of their budget for broadband investments, supplying their public institutions (schools, hospitals and healthcare units, and public administrations) with ICTs. Besides that regulatory changes were implemented to increase competition among service providers and reduce market failures, which led to declining access prices.

The investments for an appropriate infrastructure as well as the regulatory improvements resulted in increase of major usage and penetration indicators for the households, public and corporate sectors: in the latter the main indicators match EU15 averages. At the same time – while growing impressively in recent years - usage levels in the households and the public sectors has remained below the EU15. While the infrastructure improved mostly in urban areas, efforts have been undertaken to expand the infrastructure and service provision in rural areas with limited achievements so far.

#### Demographic trends

The overall demographic picture of the EU10 is quite similar to the EU15 due to the ageing population. However the first wave of negative impacts is expected to come little later, as today these countries still benefit from a sizeable younger generation entering the labour force. However, the financial and social consequences of an ageing society will affect these countries in the mid-term in a way similar to the EU15.

An ageing population makes the productivity challenge more urgent and Europe is caught in a demographic squeeze of declining birth rates and rising life expectancies. According to Eurostat, by 2050 the working population will decrease by 52 million, even after allowing for net migration, and there will be a sharply rising dependency ratio, with the proportion of people over 65 rising from 16.4% in 2004 to 29.9% in 2050.

In 1970s and 1980s Central and Eastern Europe has also observed a sharp drop in number of births, change in the pattern of starting a family, while population ageing – transformation process that started in Western Europe in mid 1960s – occurred in the region only in the 1990s. All scenarios lead to falling population numbers and to the acceleration of population ageing. Such situation opens up the field for development of eHealth (i.e. assistive technology) into older people's home and could empower the citizens through eHealth solutions and services. More people experience difficulties in movement, therefore the demand for eHealth services has been increasing (especially telecare services).

## III.2. Emerging drivers and barriers to eHealth developments

From the analyses presented in the ten Country Reports, there are various current drivers and barriers that are affecting the evolution of eHealth in the EU10, similar to the factors analysis, drivers and barriers can also be divided into three major groups: economic, policy and healthcare-related ones. Within the economic, policy and health related drivers, the main ones are the growing demand from users for more efficient healthcare services, the deeper involvement of the private sector in health service provision, the access and affordability of ICT services, the foreseen shortage of healthcare professionals, the changes in the regulatory framework, the exchange of best practices and the use of EU Structural Funds.

#### Economic drivers

A major driver of eHealth is **the growing demand from users for more effective healthcare services.** The fast income growth in the last decade in the EU10 has resulted in increasing demand for more effective health services. At the same time there is an increasing pressure from the governments on health service providers to reduce the costs of service provision, improve the quality of services leading to better satisfaction of citizens' demand, higher quality of healthcare services, increased access to these services, more responsiveness and transparency in service provision.

In most of the EU10 healthcare reforms have been initiated in order to modernise the sector to reduce treatment costs, increase efficiency and productivity of healthcare procedures and to enable more

equal access to healthcare for all citizens. Such reforms include structural institutional reorganisations, increased involvement of the private sector, shift towards more accountable and transparent financing models, which may have an impact on the demand for ICT driven services.

Relatedly demographic trends generate massive future demand for government measures towards health. Financial and social consequences of the ageing society have already been affecting the EU10. Pension expenditures and exploding costs will have to be kept under control, and the problems stemming from the shrinking labour force, which affects both production and public finances, need to be handled too. This demographic trend is an important factor in carrying out reforms regarding the healthcare sector and reinforcing the more widespread reliance on eHealth and utilisation of ICT driven services.

Besides income convergence and fast growth, the **improving access and affordability of ICT services** may be a key driver of future eHealth developments in the EU10. The focus in the last decade on the provision of advanced ICT infrastructure led to improvements in Information Society indicators, including level and quality of Internet connections, supply of institutions with ICT equipments and systems. Additionally telecommunication regulation has undergone significant reforms in most of the EU10 as an attempt to align them with the EU regulation, which overall has had positive - even though not the expected high ones - effects on prices, quality and competitiveness. Lower prices can be translated to better affordability of services and still regarded as an important driver for ICT related services.

#### Policy drivers

**Policy makers in the** EU10 generally acknowledge that the future development of Information Society, including eServices depends on the way how EU **regulations are adopted** and how EU funds are absorbed. Therefore several measures have been undertaken regarding the improvement of national regulation in order to align them with international successful practices. Regulation improvement is an important driver of eHealth developments.

> Cyprus has acknowledged that the future developments of Information Society, including eServices developments, will crucially depend on the way EU regulations are adopted and EU funds are used by the government. Therefore several measures have been undertaken regarding the improvement of national regulation in order to be aligned with international successful related practices. Regulation improvement is an important driver regarding both eGovernment and eHealth developments.

The importance of **making use of best practices** regarding the development of eServices has been recognized by most of the EU10. The use of such practices is associated with the cost savings related to the development of such services. Moreover, higher quality eHealth services that have been already successfully tested by other countries will be customized for each country needs reinforcing thus a uniform European way of healthcare service provision. For this purpose the introduction of the European Good Practice Framework and introduction of effective transfer mechanism can be regarded as a driver enabling more advanced application of eHealth.

> eHealth development on European level definitely will speed up the processes in Slovakia. The current situation does not yet generate conditions in which adequate eHealth solutions would be exchanged as very little communication is happening in healthcare between Slovakia and other EU countries. With increased mobility of people this situation will change when foreigners will be more frequently using Slovak health services.

A final policy driver of eHealth may be the **use of Structural Funds for eHealth developments**. The EU10 will be recipients of external investment funds, which may equal 4% of their GDP, significantly exceeding the level of external development funding entering these countries between 2004-2006. Besides the size of these investments, their role is important also because in most of the countries there are pressing fiscal adjustment needs (either due to the tight Euro introduction deadlines or to correction of fiscal imbalances), which will reduce the scope of domestic public investments. Therefore most of the public investments during the 2007-2013 budget period will come from the

Structural Funds and thus their efficient utilisation is a key policy priority and a potential driver for eHealth developments.

> In Slovakia the European Union has been a driver in the evolution of eServices both through pressure on harmonisation of legislation, through benchmarking and monitoring and by providing for exchange of information with more advanced countries. It is likely to remain a strong driver: the variety of frequent comparative assessments among member states create pressure on domestic public administration to keep up with developments in other countries.
>
> Additionally, the availability of funding within the structural funds for the 2007-2013 programming period should also be a driver. Both the amount of funding and priorities set for the Operating Programme Information Society should allow public authorities with projects in the area of eServices to receive required financing.

#### Health sector drivers

One of the likely drivers of eHealth is the increased **involvement of the private sector.** Public sector reform and streamlining fiscal expenditures resulted in the spread of public-private partnerships (PPPs). Many of the EU10 adopted appropriate legal background for PPPs, and started to implement PPP programmes. They plan to increase their use in order to achieve a better match between private and public funding and thus reducing, if possible, the scope of the public sector.

> In Cyprus, the public sector reform and the streamlining of fiscal expenditures resulted in defining PPP as a priority in the National Lisbon Strategy. There are plans to increase their use in order to achieve a better match between private and public funding.

The appropriate and beneficial application of PPPs depends on several factors, including the determination of those areas, where it can be used efficiently. PPPs could provide a framework for involving the private sector in the improvement of access to and content of eHealth applications, and PPPs could be used in broader projects linking IS development and healthcare reform, including eHealth programmes.

> According to the Estonian report the smart involvement of private capital can promote the use of R&D experiences from other sectors. The current healthcare financing principles in Estonia allow large-scale investments only from a few big providers or through government support. At the same time, autonomy of providers has the potential to enable the creation of market incentives for private capital to develop eServices if long-term stability and incentives for healthcare providers are promoted by government and insurance fund. There are many ways to develop PPP practices, but the most important prerequisite is a transparent and sound policy so that risks can be considered and balanced by both sides.

Another health sector related driver of eHealth may be the foreseen **shortage of healthcare professionals,** which represents a crucial challenge for most of the EU10. The increased mobility of the healthcare personnel in the enlarged European Union is driven by the significant differences in wage levels, the gaps in the non-wage related employment conditions in the new and old member states and represents a strong pull factor for the mobility of healthcare professionals from the EU10. The shortage of skilled labour may be an important driver for the use of eHealth applications, and will stimulate the substitution of labour with capital in healthcare institutions. This shift will be the stronger and faster, the earlier the major changes in healthcare provision (increased role of decentralised care, the emergence of knowledge and evidence based systems) materialise in the EU10. While foreseen shortage of skilled labour represents a pull factor, these health sector related changes are the main push ones.

### Barriers to eHealth developments

The barriers to eHealth are also divided into economic, policy and health sector related ones and include the next aspects: low level of healthcare expenditures, incomplete legislative framework, restricted healthcare structural reforms, low level of IT competence and appropriate personnel, low level of demand for eServices and efficiency versus absorption on the spending priority of Structural Funds.

#### Economic barriers

Among the economic barriers, two seem to remain important: the presence of divides in terms of access to eHealth services and the way the inflow of Structural Funds will be absorbed and spent for eHealth by recipient countries. A major economic barrier is the presence of **unequal access to and demand for eHealth.** While there has been a significant progress in terms of both the affordability and usage of eServices, there are still impediments, which slow down the growth of demand. These include the described regional, income and age differences, the low level of digital literacy and motivation to use ICT driven services, the lack of awareness of users about the supply. These impediments may constitute one important barrier for future eHealth developments.

> For example in Poland one of the main barriers is the poor demand for eGovernment and eHealth services by citizens and business. It results from limited promotion of by public bodies, lack of knowledge about the Internet and its opportunities and lack of skills on how to use the Internet and computers.

Another barrier to future spread of eHealth is the dilemma between **efficiency versus absorption approach in spending Structural Funds,** which represents in most of the EU10 the single most important non-private investment source for eHealth developments. The experiences of the current programming period showed that due to the limited capacity of public administrations the focus in spending Structural Funds was on absorption rather than on the quality of projects. There is danger of no change in the administrative capacities for the upcoming programming period. Availability of bigger pool of funding for eHealth therefore does not guarantee the availability of effective projects. As mentioned earlier, the lack of a clear vision about the future character of the health sector blocks main developments, not only the ones related to eHealth. The very same applies to the use of EU funds for the next planning period as lack of strategies ,weak and inconsistent policy priorities could lead to a waste of efforts and funds.

#### Policy barriers

The main policy related barrier seems to be the **incomplete legislative framework** as the legal background of eHealth lags behind the demand for services. The major legal constraints are related to inappropriate security measures and tools regarding patient information, identification of patients beyond an institutional level and the incomplete definition of eHealth standards. There are also no legal acts regulating reimbursement of eHealth services, which is even more relevant as reimbursement procedures for Health services are not transparent and well-defined.

> For example, in the Czech Republic there are various legal barriers hindering eHealth, including the:
> 1. Unequal legal status of documents in the paper and electronic form
> 2. Non-existence of legislative regulation of meaningless personal identification number of citizens
> 3. Impossibility of data sharing between particular registers of public administration – there exist legislation barriers hindering data sharing, even though it is technologically possible
> 4. Fragmentation of process regulation in administration procedure

There are also delays in important technical and legal developments. Two of the technical elements are particularly important: the adoption and usage of the digital signature and of eProcurement. In case of the digital signature, there are various technical and legal impediments, which have so far prevented most of the countries from adopting it. While alternative identification procedures have been applied, they can not replace digital signature and if these countries do not adopt the legal and technical

frameworks needed for digital signature, this may affect adversely the supply and the usage of eHealth services.

In the area of eProcurement the legal difficulties and the reluctance of public authorities to use them widely constitute the main problem. While eProcurement may result in better services, lower costs and public expenditures, it also increases the transparency of public purchases, makes procurers more accountable which goes against the prevailing public administration traditions and approaches. The resistance at various levels of general government (starting from small local governments to central ministries) against eProcurement is an important barrier for eHealth developments.

> The current procurement procedure also affects negatively ICT developments in Poland. An example is the call for tenders, worth PLN 82 million (EUR 21.5 million) for ICT infrastructure for courts, public prosecutor's office and prisons (over 1300 localizations) announced in May 2004. Due to the complicated appeal procedure (over 5 arbitration committee verdicts, 2 judicial sentences and awards of the Court of Appeal and one award of the Supreme Court) selection procedure could not be finalized in 2006, because of a subsequent appeal.

**Healthcare barriers**

One of the main barriers regarding eHealth developments in EU10 is the **low level of healthcare expenditures**: in 2004 the average level of healthcare expenditures to GDP was slightly above 9 % in the EU15, and slightly below 7 % in the EU10. The low expenditures are insufficient to finance the use of ICT in the health sector impacting thus negatively the eHealth developments.

> According to the country reports, even in the most developed EU10 country, Estonia the lack of investment capacity is a major barrier and ICT expenditures must be increased in the healthcare sector. Even though ICT spending has increased in recent years for both the government and providers, it is still lagging behind most advanced countries when it comes to eHealth. Only the few largest providers have the critical amount of money available for development of ICT solutions for their own needs, while most of the service providers need to be satisfied with the options offered by small local sellers who are facing the limitation of small local market.

Besides low healthcare expenditure the **limited structural and institutional changes** in healthcare sector represent another barrier for eHealth developments. Even though in all the EU10 the importance of health reforms has been recognized, the speed of its implementation has been very slow. The changes in the health sector are mainly related to reorganisation of institutional structures and healthcare financing for which the public administrations miss an appropriate implementation approach. Moreover, in most of the EU10 countries the need of developing eHealth services was not taken seriously into consideration by the proposed healthcare reforms.

The absence of the **adequate level of skills** and experiences in public administration in IT project management and implementation is another barrier. Policy makers have fragmentary look on services automation process: they try to implement individual IT tools, instead of defining clinical processes reorganisation activities. Such approach will not bring significant results as it represents a bottom up initiative that has mostly a technological dimension.

> In Estonia an emerging bottleneck is the limited availability of skilled ICT-personnel. A recent study (Kattel and Kalvet, 2006) suggests that ICT education is a major problem for Estonian entrepreneurs, and hence hindering the further introduction of innovative ICT-based solutions. The same is probably true in the cases of the eGovernment and eHealth sectors. Lack of understanding and knowledge has been described at all levels – civil servants, providers and sellers (in case of eHealth) and individuals. While sellers can potentially import the know-how from abroad, local competence is needed among other parties.

# IV. IMPACTS AND CONSEQUENCES OF E-HEALTH DEVELOPMENTS

## IV.1. Short to medium-term challenges facing eHealth

There are various challenges that the evolution of eHealth faces in the EU10. Due to the nature of eHealth some of them are similar to the major challenges faced by other European countries and are related to technical, security and ethical issues. Some of the challenges are more specific for the EU10 countries: these are the ones linked to the development of their healthcare sectors, financing the slowly expanding number of eHealth applications and adjusting their policies to European standards and major directions.

**1. Reaping the benefits of eHealth.** It is difficult to determine the economic benefits of eHealth applications due to the methodological difficulties of assessment and shortness of the available data. There have been several studies assessing the likely economic impact of eHealth in the USA and in the European Union mainly based on case studies,[48] emphasising the microeconomic benefits. Among the benefits determined by the studies, one is related to the time savings allowed by the use of eHealth applications.[49] Another effect of eHealth applications has been the cost saving allowed by the better allocation and utilisation of the labour force: efficiency was significantly raised following the implementation of eHealth solutions.[50]

Based on the presented evidence, one may argue that the online provision of healthcare services may have positive spillover effects in the EU10 as well. These potential benefits are related to the cost saving, better resource allocation and utilisation, higher labour productivity allowed by eHealth applications. These benefits may be especially worth considering in the EU10, where the efficiency of service provision is lower and resources are utilised weakly, the quality of healthcare services is low while the cost explosion is equally worrisome as in the EU15.

One of the overall expected benefits of eHealth in the EU10 can be its contribution to the slowdown of cost explosion in the healthcare sector. eHealth applications may reduce curative, administrative and reporting costs, thus could somewhat contain the healthcare sector driven cost increases.

Second, eHealth may help in better monitoring of excessive use of certain services, medicines, which may also lead to their more effective use. This is true for drug use and consumption, access to cost free services and has led to fast increase in the demand for these services.

Third, eHealth may contribute in the EU10 to institutional decentralisation: the currently too centralised institutional structure may become decentralised which may be supported also by the technological advances. leading to efficiency gains.

Finally, eHealth may contribute to the improvement of the basic health indicators, especially in the area of life and health adjusted life expectancy, death and fertility rates, major chronic diseases and death causes. The poor healthcare indicators reflect serious losses for the EU10 in terms of lost labour

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[48] One of the recent cases in this field has been the study by TanJent and empirica on the benefits of eHealth applications (TanJent-empirica (2006))

[49] In the US (within hospitals in two regions with a total population of 817,523) two years after electronic health records were fully implemented, visits to general practitioners fell by 11%, the percentage of insured persons making more than 3 visits a year decreased by 10-11%, while the percentage making fewer than 2 visits a year increased. The readily available, comprehensive, integrated clinical information reduced the use of ambulatory care, while maintaining quality and allowed doctors to replace some office visits with telephone contacts. Source: Effect of electronic health records in ambulatory care: retrospective, serial, cross sectional study Terhilda Garrido, Laura Jamieson, Yvonne Zhou, Andrew Wiesenthal, Louise Liang BMJ2005;330:581 (12 March)

[50] In Norway the first impact studies suggest that the MEDCOM project delivered savings as more than 25 thousand person-months have been saved, equalling €22.5 million. Similarly, in England in March 2005, at the Good Hope hospital, Sutton Coldfield, a team using workflow software to plan clinical procedures, found that it had cut the cost of treating leg ulcers by 26%. If these figures are extrapolated across the United Kingdom, they would add up to £150 million in savings a year. Source: http://healthcare-computing.co.uk/hitea/index.html

hours, lower labour productivity and lower employment rates. eHealth solutions may help in reversing the observed worsening of healthcare indicators, in reducing the gaps existing in the access to healthcare services caused by income, regional and health problem related divides.

Altogether, as the major goal of eHealth is to contribute to better, more efficient and equitable provision of health services, its challenges are connected to the ones of the health sector.

**2. Accelerating the development of physical and human resources for eHealth.** There are both physical and human capital related preconditions for the provision of eHealth services. A fully operational telecommunications infrastructure is a precondition for efficient regional or national eHealth solutions. In all of the EU10 countries, such basic networks exist, and what is missing is a network infrastructure connecting health service providers and other relevant stakeholders.

In most cases this involves the need for broadband connections, basic technical interoperability, and provision for data security, organisational infrastructures, and an appropriate legal and regulatory framework. For example, having one of the best broadband connections, Estonia aims to develop a nationwide framework that facilitates the exchange of health information, currently available only in local databases and information systems that are often not able to communicate with each other.

In some countries however the main physical infrastructure challenge is still the establishment of broadband access and connectivity for healthcare units. In several EU10 countries there are many rural, low income or sparsely populated regions, where the appropriate infrastructure is missing, for example broadband availability is below the average reducing the connectivity of healthcare institutions. Various policy approaches could be considered to increase broadband availability: subsidise service providers to increase broadband supply in less attractive regions or subsidise end users directly to increase their payment ability to the threshold level demanded by service providers.

The human capital challenge is related to the increase of IT skill levels in the healthcare sector: in recent years in most of the EU10, the supply of specialists with IT skills has been increasing, but level is still low and their cost of employment has been growing fast. A serious challenge for the bigger (hospitals, regional healthcare centres) and smaller (general practitioners) healthcare units is the anticipated shortage of IT professionals capable at designing and implementing IT projects, or administering and maintaining IT systems over time.

**3. Raising the level of eHealth financing.** An important challenge for eHealth developments is to increase the share of sources devoted to eHealth related investments. Approximately 5% of all health investment should be devoted to eHealth infrastructure and change management if the full potential of eHealth is to be realized. The analysed countries have in the past devoted fewer sources for this purpose, and they need to find both public and private funds to raise the level of eHealth investments. Besides increasing the level of eHealth investments, a general policy challenge is to raise the level of spending on eHealth, which as reported remained so far below the EU15 averages.

**4. Adaptation of the legal and regulatory environment.** In order for eHealth systems to be fully integrated, the existing legal framework must be adapted to fit the application of these new tools. For example it is costly and inefficient to have a secure electronic prescription system if, as is still the case in many of the analysed countries, prescriptions have to be submitted on a specified form. Similarly access to patient data rules has to be adapted to ensure that Grid technologies are useable while ensuring that patient confidentiality and security of data are maintained. These legal challenges are important for the development of eHealth applications per se as well as for the increase of the confidence of users in eHealth application.

**5. Supporting equity issues in health development.** Due to increased spending on services in general and health in particular and growing user demand, the ageing of population, increasingly recognized links between health and economic growth/well being, health has become an important topic in political agenda and health systems have become strategic societal assets and large industries. Any changes that are expected to occur in the health sector will likely affect the whole population and the main question is if the gains (and also losses) stemming from them are distributed fairly, if the solidarity of health system (a universal value accepted today) is maintained or even increased. The

challenge for eHealth is to contribute to a more equitable provision of healthcare services and to improve the access and responsiveness for vulnerable and marginalised groups.

**6. Managing security and trust risks.** The development of eHealth not only brings about new opportunities, but also new risks, mainly related to security, trust and privacy issues. In order to ensure that these risks are minimised, and that citizens are protected from the misuse of data, the legal framework provided by the European Data Protection Directives is essential to be adopted and widely used by these countries. Several EU10 countries started to implement or plan to do so legislation in a number of areas, including public information (Estonia), digital signatures (the Czech Republic, Estonia, Latvia, Lithuania, Poland) following the experiences of the rest of Europe in various other areas including patients' rights (Belgium), privacy (Belgium, Ireland), certification of patient records related software (Belgium). The challenge is to accelerate the adoption of the needed legal framework, appropriate regulatory environment and provide the technical preconditions for the efficient implementation of these legal measures.

***7.* Patient and health professional mobility.** While the mobility of patients and health professionals is another central point of the eHealth Action Plan, this is handled by most countries only indirectly. In those countries, where it exists, it is usually tackled via electronic identity and/or health cards that allow location independent access to certain services, or via web-based health records and other services that do not require access from a pre-defined location. However, the technical and organisational background for a wider application of these eHealth solutions is missing and therefore neither patient nor health professionals' mobility can be considered as significant. A policy and financing challenge is to establish these precondition to increase the mobility of patients and professionals.

**8. Monitoring eHealth developments.** Another important challenge for eHealth is the appropriate monitoring of developments. Monitoring the implementation of various projects allows the adoption of various approaches, which should be placed in the field of eHealth at different levels, from the level of individual healthcare service providers to the level of the implementation of the strategy as a whole. Moreover, developments in the field of eHealth in EU10 should be monitored in comparison with other EU states. Finally, end-user satisfaction regarding information solutions in the field of eHealth should be evaluated to determine the usefulness of the various applications.

An important aspect, which may lessen the weight of this challenge in the NMS is that many initiatives are financed from the Structural Funds – which has its own monitoring requirements. It is important and useful to create the synergies between the obligations to monitor Structural Funds and the need for monitoring eHealth developments.

## IV.2. The R&D challenges facing eHealth

Besides the general, policy related ones, there are also research and development challenges in eHealth faced by the EU10, out of which the main are presented below. .

**1. Determining users' needs.** This challenge looks at the needs of users, whether as groups (communities), or individuals, and tries to understand how to deal with the variety of different user preferences. The challenges that lie ahead are manifold, and cover many different domains; they include the political challenges of creating 'user-driven services', which will be far more likely to appeal to citizens than user-centric services. The challenges of increasing take up and confidence in eHealth services are closely related to this.

Research is required into the direct needs or demands of citizens and civil users, whether as individuals, families, households, communities, civil sector organisations, NGOs, etc., or within specific localities or regions. This should cover citizen relationships with healthcare providers, user skills, expectations and activities in relation to healthcare services. This includes the context of use, service initiation and control, the delivery environment, service visibility/fundability, utility/usefulness, access/availability, and service quality and fulfilment in relation to the specific citizen user or group.

While determining users' need per se does not make a NMS-specific R&D challenge, it is important to note that patient awareness, the rights of the patients are underdeveloped in many of these countries, which may make it harder to determine the need of users. Technological challenges are not specific for the EU10 as a whole; nevertheless it is important to note that the approach of users to technology may bring different evolution paths in the NMS to the various eHealth developments as well. It is important to discover, how alternative technologies (such as mobile or digital TV), which may play a stronger role in future eHealth developments may be able to spread easier among users in the NMS.

**2. Integrating information systems.** Currently the service providers, the public and private insurance companies, the public administration units, the national and regional healthcare centres pose with a variety of information. One problem increasingly faced by the service providers is the limited possibility to integrate the data and information available at various service providers or healthcare units. To address the aspects related to interoperability and integration of existing information systems (e.g. seamless data collection and integration from electronic health records and health monitoring systems) the existing systems should be integrated and the new developments should be harmonised among the various stakeholders.

**3. Innovation initiatives.** Health can contribute strongly to research initiatives through its comprehensive identification of emerging and new horizons for eHealth research e.g., personalisation of health services and information, and new diagnostic and monitoring systems. The goals in the EU10 may include novel methods in apparently distant areas like drug discovery, wearable or ubiquitous monitoring systems, which will bring researchers closer to personalised diagnostic and therapeutic strategies.

**4. Meeting the Integration and interoperability challenge.** The main technological challenges to be addressed regarding the development of eHealth are the integration and interoperability, personalized services for all, user needs, and trust and security. In order for eHealth applications to work across networks, systems must be interoperable and must have the possibility to be integrated. There is little point in making large investments if the information systems that are developed cannot communicate with each other. In order to reap the benefits of eHealth across all health services and across the countries, further research is needed to develop and adopt common standards which allow health professionals to work together.

To this aim, research needs to be carried out to understand how healthcare units should work together to ensure that systems and applications are completely interoperable. Research can work towards enhancing the relationship between citizens and healthcare service providers due to the increased perception how easily eHealth services may be used.

**5. Enhancing trust and security.** Trust and security is concerned with building and maintaining trust and confidence between all stakeholders in all directions, for example in relation to network and data security, data protection, identity management, authentification, privacy, surveillance, and digital rights management. Research is needed to ensure trust and security between government and citizens and the civil sector as users of eHealth services. Massive data transfers and exploitation between service providers and the users require sound data protection, based on legal, technical and institutional safeguards and standards.

**6. Measuring usage and impact of eHealth.** An important R&D challenge is to develop appropriate indicators and procedures to measure real usage and impact of eHealth. Currently the actual and potential usage of eHealth is barely measured and considered, when deciding on health sector developments and it should be monitored much closer by service providers.

Another important challenge is to measure the impact of eHealth applications, which are a relatively new area and a similar R&D, challenge in the more advanced countries. Appropriate indicators and methodologies should be developed to assess the effect of eHealth on patient-doctor visits and related time savings, on errors committed in the healthcare system, on savings stemming from the better monitoring of social security contributions and healthcare spending. Besides economic impacts, the broader social and welfare effects of better and more equitable access, improved life conditions, independent living for elderly and disabled should also be considered.

**7. Cost-benefit analyses.** Similar to the lack of impact assessment, cost-benefit analysis has been conducted also rarely, while existing experience of other EU countries offers room to carry out such assessments. Technological advances tend to increase overall costs of health services by offering opportunities not previously available in treating illnesses. Cost-effectiveness is not the only criterion for admitting the benefits of an eHealth solution as they should be benchmarked among others on quality of care, increased solidarity, consumer and staff satisfaction, etc. Therefore the cost benefit analysis should be seen from another perspective: if the gains are distributed fairly, if the solidarity of the health system will be maintained or even increased, will eHealth improve access and responsiveness for the vulnerable and marginalised groups? If the answers to this question are positive, then it provides one element for cost-benefit analysis going beyond the pure economic aspects.

## IV.3. The lessons learnt from EU10 eHealth developments for Europe-wide trends

The last 4-5 years of eHealth developments in the NMS have provided the policy and decision makers, and the researchers with various lessons to be considered when designing future goals and policies. This chapter reviews briefly the main lessons learnt from eHealth trends in the NMS for European wide policy issues.

**1. eHealth take-up takes time**. The experiences of NMS countries – and also of those belonging to the rest of Europe – show that the take up of eHealth applications is a slow, time consuming process. There are important preconditions that should be met in order to experience a rapid development of eHealth applications. They include but are not limited to the security of data access and data sharing, the presence of appropriate technological infrastructure, the supply of users with digital skills and literacy, the motivation of service providers to switch to online services and to progress with the related institutional changes. The presence of these preconditions certainly depends on funding available for eHealth, on the determination of policies, on the institutional and legal stability and support, which may require some time to be developed.

**2. Healthcare reforms and eHealth are closely linked**. The essence of eHealth developments is to provide the preconditions in which health services may be supplied in higher quality with fewer mistakes, time and possibly costs. Healthcare reforms also aim at establishing those frameworks within which the health services may be provided faster, better, at higher quality and could meet the demand of users better than currently.

So far only limited number of countries tried to combine the healthcare reforms with the diffusion of eHealth, though the later may simultaneously help in and press for reforms. Progress in eHealth applications may support the institutional reorganisation of the healthcare sector, can contribute to streamlining services and monitoring better the access to and supply of health services. While neither health reforms, nor eHealth applications are capable per se of reducing healthcare costs (though they both may slow down the cost explosion that has been experienced), they may lead to such organisational, institutional changes, which reduce costs and improve simultaneously the quality of services. On the other hand the reforms may also stimulate eHealth applications, as the rationalisation of the institutional structures, the increase in cost sensitiveness of health service providers and the growing cost pressures on service providers may independently act as significant stimuli for eHealth developments.

**3. Appropriate incentives are needed.** While the private sector may be a driver in generating eHealth services and in the increase of the capital spent on eHealth developments, its involvement to these changes requires appropriate incentives. It should be considered that eHealth investments are risky and costly with high sunk costs, that notwithstanding the growing health pressures the demand for health services is unstable, that public service providers have biased incentives. Therefore the public policies on eHealth should apply appropriate stimuli for public service providers or should put peer pressure on them.

**4. Policy determination is crucial.** The role of determined policies and associated clear priorities and visions is important for eHealth. As the experience of the EU10 shows there is frequently a strong

resistance among health service providers against the institutional, operational and structural changes implied by eHealth developments. On the other hand,, the users are frequently low motivated in using eHealth services, they have affordability and access problems which complicate the picture. Under these given conditions policy makers need to be very determined to proceed with the reforms and policy measures, should allocate appropriate funding for eHealth developments, and should try to involve the private sector to eHealth policy formulation, implementation and funding.

**5. The role of supply and demand side barriers.** It is crucial to consider the role of supply and demand side barriers in promoting the development of eHealth. Among the supply side ones it is crucial to have the needed level of the technological and human capital background for the operation of eHealth services, starting from the provision of equal and widespread broadband access to service providers, from the continuous increase of eSkills levels of healthcare employees to the organisational and structural changes that are linked inside the healthcare units to these preconditions. After the technological and human capital barriers are overcome, the focus could be diverted more towards content issues related to eHealth services. Both the administrative units (public health insurance funds, ministries) and the private or public service providers should focus more on providing reliable, secure and demanded content.

In case of demand side barriers the most pressing ones are linked to various non-digital (income, professional and regional) and digital divides, the lack of motivation of the potential users to access and use eHealth services, the low level of knowledge of the potential users about the benefits of eHealth applications. The divide barriers can mainly be overcome by appropriately designed structural reforms and incomes policies, while the motivation and usage problems by targeted policies on digital literacy, information sharing and promotion.

## IV.4. Policy options for eHealth in the EU10

While overall the country studies reflect the earlier reluctance of policy makers to devote significant attention to eHealth, there have been two positive changes. First, in recent years eHealth has received somewhat broader attention from policy makers. Second, there has been an increased alignment of domestic policies and laws with EU guidelines and an emergence of new opportunities to finance eHealth from Structural Funds. The current policy options available for policy makers in the EU10 for eHealth development are divided into three groups. The first contains the ones related to the health sector, the second those, which are linked to eServices and information society, while the last the ones directly connected to eHealth.

### 1. Health sector-related measures

As eHealth is part of health its development partly depends on the structural reforms in the health sector. Reforms in healthcare are on the agenda in most of the countries, even if the general direction of reforms cannot be defined. Even if measures are often in the opposite direction (e.g., centralisation vs. privatisation) the general goals are similar – namely, improved quality, efficiency or access. While this report does not deal with the true and reasonable definition of goals for structural reforms in healthcare, it can be said that the needed reforms must take place regardless of the application of eHealth, and smart use of technologies can facilitate the reform process. The role of eHealth in fostering or even enabling the achievement of certain health sector reform goals is a serious issue for research. eHealth must be studied in the context of buzzwords such as ‘integration of care’ and ‘deinstitutionalisation of care’.. (Source Estonia Country report)

Thus these structural reforms must take place regardless the application of eHealth, while the role of eHealth is to fostering or enable the achievement of certain goals. The health sector related measures are country specific, but they should target at least the following issues in order to support eHealth applications:

1) Reshaping financing models and more proactive approach towards PPPs are needed to bring more private funds to health sector
2) Reform of incentives of medical workers is needed to foster the utilisation of eHealth applications. Currently the reluctance to use them inhibits the spread of eHealth.

3) Reform of the supply side, of health service providers: most of the EU10 countries need a significant change in the institutional and structural features of the health service providers.

Additionally, it is not only eHealth that can profit from the health sector reform but it is true the other way around. The introduction of ICTs and eSolutions, the re-modelling of patient cases and various procedures can lead to a better, closer-to-optimal institutional structure, division of labour and task distribution in the health sector and within the various health units (hospitals, etc). An important means for reform could be better measurement of health system performance – including health outcomes, quality of care, waiting lists, patient satisfaction and system responsiveness. eHealth can be a tool to break the old rigid bureaucratic way of the inherited state-owned healthcare and to move it towards a customer (patient)-oriented approach.

**2. eServices and Information Society related measures**

eHealth is part of eServices and Information Society, therefore the trends in the development of latter affect its demand and usage. The following issues are important to promote eHealth:

1) Although most EU10 catch up in general penetration, it is important to develop further the infrastructure as eServices require broadband connection and telemedicine needs heavy infrastructure investments.
2) Broadening digital literacy and eSkills of the population and especially of the medical staff is linked to the reform of the incentive system of healthcare workers.
3) eInclusion of those groups, who are mostly depending on eHealth services: the elderly, the disabled, the low-income and marginalised groups as they are more depending on healthcare and are the most cut-off from Information Society developments

**3. eHealth related policy measures**

Within the more eHealth-specific policy measures, most of them are country-specific ones, but several can be summarised as those options that are seen as necessary in several countries.

1. **Finalising and implementing eHealth Roadmaps.** In addressing the European challenges in eHealth, the eHealth Action Plan recommended the Member States to develop their roadmaps, which would set their intentions and priorities in eHealth. Based on the intentions of the European Commission to stimulate each country to "develop a national or regional roadmap for eHealth, most European countries, including the EU10 have tried to implement this The roadmaps prepared in the EU10 are now intensely discussed or already under implementation. The policy issue is many EU10 is to consolidate these plans and harmonise the short-to medium-term policy measures with these broad and longer term strategic priorities.
2. An important policy option for eHealth developments is the switch to more **proactive government policies**. Besides having national visions of eHealth embedded in Roadmaps, it is important to have dedicated policy owners, who can implement this vision. An important ingredient of this is the promotion of and awareness raising about eHealth, which is needed in a wide circle of the population as well as even among healthcare professionals.
3. **Legal measures** also constitute an important element of policy priorities, where the role of policies is multitask and depends on the impediments. There is a need to find solutions that simultaneously meet the trust, protection of data and security concerns of users. A key issue is the legislation of electronic health data security, keeping and sharing medical records in electronic form, which is missing in many countries. Regulation of personal data often inhibits the usage of electronic health information in broader way.
4. **Implementing major eHealth projects.** There are several key projects that involve implementing national health information systems that focus around basic national Electronic Health Record systems (e.g. the Czech Republic, Estonia and Slovakia ), electronic health records and national eHealth networks (Estonia), national health portals (Hungary and Slovakia), aimed at informing citizens and health professionals. Further implementation

programs include various forms of eCards, currently only used for administrative and insurance status validation purposes (Slovenia for example).

While the first steps have been carried out in this direction, a further policy issue is in many of the EU10 to design and introduce ePrescription and eOrder forms for medicinal products and medical devices as well as a national, accessible database of medicinal products which will include all medicinal products used for medical treatment of patients: registered, unregistered and those registered according to the centralised authorisation procedure. Another database needed is an official national database of medical devices with classification.

5. **Harmonising decentralisation and interoperability.** The threat for interoperability may come from the reform of the health sector as in most cases this will bring along more independence for the actors, which will make harder to ensure interoperability of the system. In case of health insurance services, interoperability and data sharing is an important new challenge for the health insurance system. Similarly, greater independence for medical actors, most importantly for hospitals, will require more harmonised and interoperable solutions in eHealth databases and technology, while maintaining competition among the actors.

6. **Developing national Electronic Health Records (EHR).** Achieving a European health record is not yet an overarching goal, but collaboration on developing individual countries' health records or basic patient summaries as a first step towards more comprehensive records appears to be an aim of increasing interest to many of the Member States. In the area of Electronic health record (EHR) a long-term objective is a system of regional or nationwide summaries, or sometimes even full (occasionally life-long) document-based or deeply structured records for each citizen. The development of electronic health records can be seen in many of the EU10 countries, but overall there is only one country, the Czech Republic, which has a fully implemented electronic health record system of a countrywide scope. An important policy priority for others is to develop nationwide health records in order to register, monitor and service the patients better.

7. **Ensuring appropriate financing.** A crucial policy option for eHealth development is the enlargement of pools available to finance investments: the sources may come from the public and private sectors as well as from abroad. As most of the healthcare units are public institutions, they need to increase the share of eHealth applications in their budgets, while national healthcare programs should increasingly rely on eHealth solutions. In the past years existing eHealth strategies did not include financial programming and funds allocation.

   On the other hand the involvement of private funding is crucial for both health and eHealth development. Private sector involvement can take place in several forms: by entering private funding into the system by privatisation of healthcare units, by applying in a broader scope PPP solutions, by developing ICT skills and deepening multi-stakeholder partnership with IT companies.

   Final area of financing eHealth is the Structural Funds: these funds should be used to reduce the most important bottlenecks, to spend them for such developments, which may generate sizeable spill-over effects and additional spending and contribution from the private sector. Besides them countries should tap such special EU funds as eTEN, FP7 IST for financing eHealth developments and/or research.

8. **Participating in European projects.** There are several European wide projects, where the actors from the EU10 could and should take part. One of these areas is the development of the European Health Card. Certain countries of the New Member States have raised the issue of setting up European Health Information and Clearing Centre. This institution would accelerate the clearing process of paying for healthcare provided to enrolees of another member state's healthcare system. Beyond this integrating the European Health Insurance Card (EHIC) is a policy issue, which supports immediate access of travelling citizens to healthcare when in

need by using a secure web based application, which assures participating hospitals of the insurance status of clients.[51]

There are other relevant eHealth projects. One of them is the TEN4Health project which involves health insurance companies and hospitals in Austria, Belgium, the Czech Republic, Germany, Italy and the Netherlands. Another relevant for some EU10 countries project is the Baltic eHealth Network, which established a secure internet based infrastructure and pilots the use of eRadiology and eUltrasound telemedicine services across national borders between Denmark, Norway, Sweden and hospitals in Estonia and Lithuania.

The development of cross-border services and the provision of pan-European services are in line with the expectations of the European Union and it may also be the ideal solution for small countries. It is important to promote international (pan-European but also even global) cooperation in this field, which would need among others international forums of scientists, decision-makers, health professionals and integrated international sharing of experiences for all stakeholders.

[51] According to the available evidence hundreds of thousands of citizens have already benefited from no longer requiring the E111 paper form or a separate EHIC when travelling abroad. In: eHealth priorities and strategies in European countries. Brussels 2007

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The present Synthesis Report is built on a series of national studies prepared in the framework of the project. The national studies are the following:

**The Development of eServices in an Enlarged EU: eGovernment and eHealth in the Czech Republic**

Responsible institute: EEIP, A.S.
Authors: Dalibor Veřmiřovský
Lucie Antošová
Miroslav Zámečník
Miloš Čebík
Ján Slavíček

**The Development of eServices in an Enlarged EU: eGovernment and eHealth in Cyprus**

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**The Development of eServices in an Enlarged EU: eGovernment and eHealth in Estonia**

Responsible institute: Tallinn University of Technology and
PRAXIS Center for Policy Studies
Authors: Tarmo Kalvet
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**The Development of eServices in an Enlarged EU: eGovernment and eHealth in Hungary**

Responsible institute: ICEG European Center
Authors: Pál Gáspár
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**The Development of eServices in an Enlarged EU: eGovernment and eHealth in Latvia**

Responsible institute: Baltic International Centre for Economic Policy Studies (BICEPS)
Authors: Ieva Moore
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**The Development of eServices in an Enlarged EU: eGovernment and eHealth in Lithuania**

Responsible institute: Lithuanian Free Market Institute
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**The Development of eServices in an Enlarged EU: eGovernment and eHealth in Malta**

Responsible institute: ICEG European Center
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Pál Gáspár
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**The Development of eServices in an Enlarged EU: eGovernment and eHealth in Poland**

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**The Development of eServices in an Enlarged EU: eGovernment and eHealth in Slovakia**

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**The Development of eServices in an Enlarged EU: eGovernment and eHealth in Slovenia**

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European Commission

**EUR 23701 EN – Joint Research Centre – Institute for Prospective Technological Studies**

Title: The Development of eHealth in an Enlarged EU: Synthesis Report

Authors: Eleni Christodoulou, Angela Dunbar, Pál Gáspár, Renata Jaksa and Katarina Krapez

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**Abstract**

In 2005, IPTS launched a project which aimed to assess the developments in eGovernment, eHealth and eLearning in the 10 New Member States at national, and cross-country level. At that time, the 10 New Member States were Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovenia and Slovakia. A report for each country was produced, describing its government and health systems and the role played by eGovernment and eHealth within these systems. Each report then analyzes, on the basis of desk research and expert interviews, the major achievements, shortcomings, drivers and barriers in the development of eGovernment and eHealth in one of the countries in question. This analysis provides the basis for the identification and discussion of national policy options to address the major challenges and to suggest R&D issues relevant to the needs of each country.

In addition to national monographs, the project has delivered three synthesis reports, which offers an integrated view of the developments of each application domain in the New Member States. This report gives a comparative assessment of eHealth policies and institutions, problems and achievements with eHealth in the EU10. It also shows the examples of best practices with in eHealth developments, analyses the possible policy options at local, regional, national and European levels and highlights the most important future technical and non-technical R&D challenges specific to eHealth.

Furthermore, a prospective report looking across and beyond the development of the eGovernment, eHealth and eLearning areas has been developed to summarize policy challenges and options for the development of eServices and the Information Society towards the goals of Lisbon and i2010**.**

The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.