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Evaluating eGovernment in the Large - A Requirements Oriented Approach

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ABSTRACT

An increasing level of cooperation between public administrations nowadays on national, regional and local level requires methods to develop interoperable eGovernment systems and leads to the necessity of an efficient evaluation and requirements engineering process. In this paper, we propose a framework to systematically gather and evaluate requirements for eGovernment in the large. The evaluation framework is designed to help requirements engineers to develop a suitable evaluation and requirements engineering process. The methodology is motivated and explained on the basis of a European research project.

Keywords

Evaluation, eGovernment, Interoperability, Framework, Requirements

INTRODUCTION

The European Union keeps growing and member states become more cross-linked every day. Some reasons are that governments are requested to work together more frequently, more intensely and in a vast and ever evolving environment. The drivers of change are manifold: modernization, a huge gap between the burden of work and the available resources, new legal settings and strategic commitments, new ICT[1], keeping up with the change taking place in private business settings, higher expectations for improved quality of service, enhanced public value generation, etc. One could list a large number of aspects implying the need for a smooth cooperation among public administrations and cooperation with their stakeholders on the basis and by means of advanced ICT (Ziemann, Kahl and Matheis, 2007). In this respect, eGovernment in the small means to implement concepts, technologies and tools to pave the way for eGovernment in the large which aims to make such visionary cross-organizational collaboration possible.

What could be considered a fact anyway, is the underdevelopment of public sector compared to business sector in terms of ICT adoption, not to mention the lack of interoperability (IOP) at all levels, which lead on one side to a different business perception of the IOP problem (and of the different types of lacks of IOP) and to different requirements for the IOP solutions available. Regarding the development and application of ICT solutions the main challenges are the requirements specification and the management of customer requirements (Sommerville and Sawyer, 2003). Main objective of this paper is to gain a clear understanding of the interoperability problems or needs of public administrations and to capture their requirements in order to support the application of any IOP solution to public administrations.

[1] Information and Communication Technologies

The presented framework of this paper is aimed at analyzing the needs of public administrations in terms of eGovernment in the large by improving the process of discovering, documenting and evaluating requirements. In this context, three main action domains were defined: the problem space, the requirements space and the solution space.

The paper is structured as follows: First, the scope of IOP in eGovernment is presented including a snapshot of IOP in eGovernment. Based on this, we will discuss the differences between eGovernment in the large and eGovernment in the small and present an IOP lifecycle to support eGovernment in the large. The following section introduces the evaluation framework to discover, document and evaluate requirements for an eGovernment in the large taking into account the problem, requirement and solution space. Afterwards, we present the results of the application of the framework within the European research project R4eGov[2]. Finally, we provide a summary and describe future work.

SCOPE OF INTEROPERABILITY IN EGOVERNMENT

Within a growing Information Society as mentioned before, networked governments have become a crucial factor. A major challenge for Governments across Europe is to link up heterogeneous systems in a way that these can work together smoothly. The obstacles to overcome in the public sector are a vast amount of stand-alone solutions under local control, which need to work together to enable seamless government. Often, these legacy systems may not be changed and adapted (Werth, 2005).

As a consequence, other options have to be found to pave the way for a smooth cooperation and collaboration. To enable cooperation (either in terms of collaboration or coordination), two approaches can be identified: integration or interoperation. Integration can be defined as the forming of a larger unit of government entities in order to merge processes, systems, and/or shared information (Klischewski and Scholl, 2006). Integration is seen as not achievable across organizations for several reasons (Werth, 2005):

- the majority of eGovernment systems will always be heterogeneous; and
- the configuration of systems and definition of processes will always remain under local responsibility, management and control.

Since new emerging technologies allow loose coupling of systems by exploring web services, service-oriented architectures (SOA), etc., hugh monolithic systems integrating heterogeneous legacy systems are required no more. As a consequence, interoperation has become the primary focus of investigation. In a working document, the European Commission defined IOP as "*the means by which the inter-linking of systems, information and ways of working, whether within or between administrations, nationally or across Europe, or with the enterprise sector, occurs*" (European Commission, 2003, p. 6). This definition covers a wide understanding, addressing all levels of IOP (organizational, semantic, and technical, as well as across public/private/civic sectors). The European Interoperability Framework (EIF) of IDABC aligns IOP with "*the ability of information and communication technology (ICT) systems and of the business processes they support to exchange data and to enable the sharing of information and knowledge*" (European Communities, 2004, p. 3).

Klischewski and Scholl characterize interoperating systems and applications via independency, heterogeneity, and control by different jurisdictions/ administrations or by external actors; yet also cooperation in a predefined and agreed-upon fashion [KS06]. Likewise, interoperation can only be reached by means of open standards (Wimmer, Liehmann, Martin, 2006).

To exploit the potentials of modern ICT to reach the vision of systems „*working in a seamless and coherent way across the public sector*" (Cabinet Office – Office of the E-Envoy, 2004, p. 4), proper mechanisms of cross-organizational IOP are required, which enable different governments, and software components and applications to smoothly communicate with each other and to work together in the given settings. The EIF and other literature stress that IOP needs to be addressed on different levels to enable communication and cooperation among systems and services (Bellman and Rausch, 2004; Benamou, 2006; European Commission, 2003; Guijarro, 2004; European Communities, 2004; Klischewski and Scholl, 2006; Sturm, 2007; Tambouris and Tarabanis, 2004; Wimmer et al., 2006):

- *technical interoperability*: Linking computer services and systems together so that the systems and applications are able to communicate with each others based on standardised interfaces and commonly used open standards for metadata, document and data formats (e.g. XML, UTF), communication protocols (e.g. SOAP, HTTP, IP), and technologies (Web Services, etc.).

[2] http://www.r4egov.eu

- *semantic interoperability*: Establishing a unique meaning of exchanged data, information and procedures by adding semantics to the information objects, or by establishing glossaries, thesauri or even ontologies. Standards in the field of semantic interoperability are required to ensure the exchange of information without depending on interpretations of humans. Only if the involved parties interpret data and meta-information consistently in the same commonly agreed-upon unique understanding, the information can be processed automatically in a meaningful manner. Thereby, standardised data definitions (e.g. XML, RDF, OWL, etc.), process models and object description frameworks are being used.
- *organisational interoperability*: This level of IOP – the most complex one – is concerned with aligning business processes and information architectures with organisational goals. Furthermore, overall agreements are settled on organisational and legal level to enable processes to co-operate beyond organisational and state borders.

All three levels of IOP deserve equal attention in order to make systems communicate with each other and to link up governmental systems and services beyond organisational and national borders. With the linkage of administrative processes and data a significant increase in efficiency and lower operational costs can be achieved. Sturm describes numerous potentials for IOP in eGovernment as e.g. faster processing in administration, improving quality and service, organizational improvements or reduction of costs (Sturm, 2007).

It also became clear, that IOP can only be reached step by step. As a consequence, the next phases of future IOP activities should investigate two perspectives of IOP: eGovernment in the large (longer-term strategy) and eGovernment in the small (implementations achievable in the next few years).

eGovernment in the large vs. eGovernment in the small

The overall aim of IOP is to provide tools and methodologies for enabling organizations to smoothly collaborate in different use-contexts thereby being supported with advanced ICT. Aiming at **IOP in the large** means to enable smooth collaboration horizontally (across organizations of the same level of government: e.g. municipality with municipality) and vertically (across organizations of different levels of government: e.g. local – national – European). Thereby, organizations are probably not any more fully mastering the coordination of the cross-organizational processes lined up across organizations. E.g. a European directive enables an authority to check the registry entry of a bidder from another member state. In IOP in the large, the authority contacts the portal of the home business register (or a European business register) to gather the registry script from the bidder. Full IOP is reached when the home business register's system can retrieve the company registry certificate from any other Member State's business registry without having to agree on a standard data format of the script and with clear understanding of the peculiarities of the legal forms of each Member State without needing to bilaterally negotiate the meaning of the form's characteristics. In this IOP in the large, the Member State's organization is not mastering any more all point-to-point interfaces with other Member State's business registers. Instead, one unique IOP format is agreed upon, which is used by all Member State's business registers and other public and private organizations. Such IOP in the large is not feasible in the next few years. However, it is a driving vision for long-term networked governments.

In this context, **IOP in the small** will investigate concepts, technologies and tools to pave the way for such visionary cross-organizational collaboration while preserving the ability – and testing the concept – for IOP in the large. IOP in the small is understood as the organizations aiming at collaborating across their organizations to agree upon common IOP means to enable cross-organizational process execution supported with ICT. In this way, the organizations are fully in control of when and how the organizations collaborate to execute a public service.

Towards an IOP lifecycle for eGovernment in the large

The following IOP lifecycle serves as an organizing mechanism for managing the development of IOP solutions. Further on, it provides a structure for analysing requirements in a more detail. The single phases of the IOP lifecycle have been derived from existing lifecycles (e.g. WfMC (Hofer et al., 2005), FEAF (CIO Council, 2001), ArKoS (Hofer et al., 2005) or Matheis, Ziemann and Loos, 2006) according to their suitability to serve as a basis for an IOP lifecycle taking into account the needs of public administrations (e.g. by giving more importance to a data and document phase that is characteristic for eGovernment scenarios).

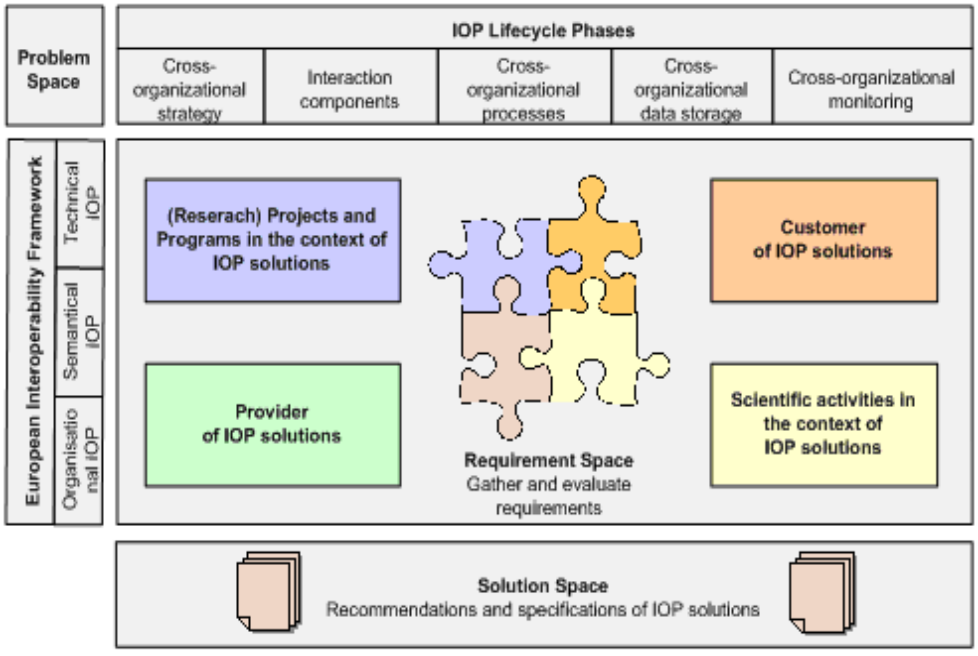
The IOP lifecycle will answer the question of how to achieve IOP between legacy applications as well as how to design novel applications to be interoperable. The lifecycle follows the goals to include a broad preparation phase (strategy) and a feedback providing phase (monitoring) as well as the development of elements found in each enterprise information system: data and processes. Taking into account the need to prepare IOP solution for use in SOA, it also included a phase for the development of services (interaction components). Thus, the proposed IOP lifecycle covers the following five phases:

- The *cross-organizational strategy* phase refers to the development of an overall strategy of how to achieve IOP. In comparison to detailed concepts for single areas of IOP, this part defines a coarse grained strategy for which concepts to apply to secure and safeguard IOP.
- The phase of developing *interaction components* identifies and adjusts the components being part of a cross-organizational process. In order to identify such components, organizational (e.g. interaction policies), functional (e.g. process chains, data exchange standards) as well as existing technical components (e.g. interaction protocols, web services, or modules of a legacy system) have to be taken into account.
- The phase of *cross-organizational business processes* provides methods to develop and adjust interacting processes. This phase refers in a first step to the modeling of existing or intended cross-organizational processes by using modeling languages like the Event-driven Process Chain (EPC). Based on this, the phase aims in a second step at the execution of the modeled processes.
- The phase of *cross-organizational data storage* concentrates on collaborative management of data and documents. This comprises methods to automate document flows, to implement document standards, to annotate data etc.
- The phase of *cross-organizational monitoring* provides methods to supervise, monitor and analyze the cross-organizational processes, components and data repositories in order to improve the effectiveness and efficiency of the collaboration.

Note, that steps 2, 3 and 4 describe the design and implementation of distinct interaction dimensions but could be executed in parallel. Thus, seeing from a time perspective, the sequence of the IOP lifecycle would be step 1, step [2,3,4] in parallel followed by step 5.

FRAMEWORK FOR GATHERING AND EVALUATING REQUIREMENTS FOR EGOVERNMENT IN THE LARGE

In this section, the methodology for the elaboration of the requirements is described. The conceptual framework has the challenge to bring together the wide spread perspective of the different sources which requirements arrive from. The methodology takes into account existing requirements engineering approaches both from literature (e.g. Hull, Jackson and Dick, 2005; Sommerville and Sawyer, 2003) as well as research projects (e.g. ATHENA[3]). In this context, three main action domains have been identified: the problem space, the requirements space and the solution space. Figure 1 depicts the overall methodology for the requirements combination process and shows the different sources the requirements come from.



[3] http://www.athena-ip.org

Figure 1: Evaluation Framework

The **Problem Space** addresses the particular needs of public administration to solve their current IOP problems. Different perspectives (organizational, semantical, technical), implementations achievable in the next few years to longer-term strategy as well as different phases to realize IOP solutions are comprised by the analysis of the problem space. The general question to be answered here is: how is the maturity of IOP solutions perceived in the context of eGovernment and what are the required perspectives to enable public administrations to adopt a specific IOP solution to solve their problems?

Against the background of eGovernment, the problem space points out the main IOP lacks or needs at all levels within public administrations (see "Scope of IOP in eGovernment"). Thus, the requirements spanning perspectives of the problem space are represented by the IOP levels of the EIF and the phases of the IOP lifecycle considering both the eGovernment in the small and the eGovernment in the large approach. Further on, the adoption of the EIF framework and the IOP lifecycle permits an initial classification for the requirements of the requirement space.

The needs of public administrations that an IOP solution should take into account when trying to solve IOP problems are described in detail within the **Requirement Space.** The general question to be answered here is: what requirements (independent of specific IOP solutions) can be specified by public administrations to solve their IOP problems?

The requirement space represents the beginning of the methodical requirements elicitation process. Within a *first step* requirements are gathered and derived regarding different sources of requirements:

- Analysis from case studies and needs of the IOP solution customer
- Analysis of (research) projects and programs
- Analysis of the literature and experience form scientific partners
- Analysis of the products and experience from IOP solution provider

As a *second step* the requirements are presented in a synthesized format. The aim is to condense the great amount of gathered information to a form that allows taking measures in single phases of the IOP lifecycle and/or the EIF. In addition, weights put on the requirements will be the basis to drive and evaluate the (research) activities to develop IOP solutions within the solution space.

The **Solution Space** comprises a critical analysis and evaluation of the developed IOP solutions regarding the requirements identified in the requirements space. The basic question to be answered is: are the proposed IOP solutions (e.g. IOP architectures) suitable for public administrations? If not what are the necessary modifications to guarantee that the IOP solution fulfills the required needs?

Based on the analyzed and weighted requirements of the requirement space, the evaluation criteria and the baseline for the IOP solution and the needed tools, guidelines and concepts is defined within the solution space. The results should flow into the methodical and architectural specifications of the IOP solution. The tools, guidelines and concepts must embody a long-term view of eGovernment in the large, while their application and implementation regarding need to be scalable and customizable for a step-by-step advancement of reaching higher levels of IOP over time.

APPLICATION OF FRAMEWORK IN AN EUROPEAN RESEARCH PROJECT

Based on the described evaluation framework the requirements analysis process has been carried out within the R4eGov project in order to discover, document and evaluate IOP requirements for an eGovernment in the large. Taking into account the objective of R4eGov, the focus here is on the requirements that should be considered in order to develop methods for implementing IOP systems as well as for designing and evaluating an eGovernment in the large (Matheis et al., 2007). Note, that the results of the requirement analysis process derived from the application of the framework offer a first overview of the IOP situation of public administration. This data can be useful for obtaining general requirements that are applicable to most of IOP solutions regarding IOP in the large but do not provide requirements needed for all specific IOP and/or eGovernment topics.

Synthesis of problem space

To further analyze the problem space the IOP lifecycle phases and IOP levels were further detailed. Table 1 illustrates, that the elements covered by the EIF can be matched to the IOP lifecycle phases.

EIF / IOP lifecycle phase	**Organizational IOP**	**Semantical IOP**	**Technical IOP**
Cross-organizational strategy	Business goals, legal constraints, Enterprise Architecture	Coarse grained specification of data exchange	IT Architecture
Interaction components	Identify services, making services available, describe service functionalities	Describe data being used by services	Open interfaces, interconnection services, WSDL, machine interpretable service level agreements
Cross-organizational business processes	Defining business processes; specifying organizational responsibilities	Describe data contained in processes	Business protocols (e.g. ebXML), executable processes (e.g. WS-BPEL), transactions (e.g. WS-atomic transaction)
Cross-organizational data storage	Describe data protection, specific data classification systems	Describe precisely meaning of exchanged data, ensure interpretability by different systems, document/form specification	Data integration, data presentation, XML schemata, technical data protection
Cross-organizational monitoring	Controlling of processes, compliance management	Annotate data for monitoring/controlling purposes	XML based annotation for monitoring purposes

Table 1: Matching EIF and IOP lifecycle phases

The reason why we do not only use the EIF within the problem space is that the lifecycle phases are closer aligned to need typically required in development of software systems. It explicitly focuses on the elements that constitute a software system and on the preparation and analysis of such systems. The identification of topics in table 1 served as basis to structure the interviews and questionnaire in order to gather the requirements in an effective way. Based on this, the R4eGov user, industry and scientific partners were asked how far the different IOP lifecycle phases and IOP levels were important for their current and planned IOP activities in order to evaluate the relevance of the single components. In the following the results of the survey (especially the prioritization of the methodical requirements) that was based on a questionnaire on methodical interoperability requirements are presented. In this context, we asked the R4eGov user partners, industry partners as well as scientific partners to prioritize the initial set of methodical requirements in view of their organization (e.g. specific use-case, or ICT provider/consultant of cross-organizational e-government solutions). Table 2 summarizes important figures of the R4eGov partners, concerning the number of partners per group and the number of involved countries within the specific group.

Partner group	**Number of partners**	**Number of involved countries**
User partners	6	5
Industry partners	8	5
Scientific partners	5	2

Table 2: Data source general information[4]

[4] http://www.r4egov.eu

Figure 2 shows the results of the prioritization regarding the different phases of the initial R4eGov IOP lifecycle. The results illustrate that the cross-organizational business process activities are classified as most important on average (4,28). Even though this phase is most important for the industry partner (3,83) and the scientific partner (5,0), the user partner rated the strategy phase as most important (4,5). This confirms the impression captured during the interviews with the user partner that an overall IOP strategy is very important for administrations in order to convince the stakeholders of the benefits of interoperability. Thus, the other phases should be supported by a corresponding IOP strategy. Due to the fact that most administrational processes are document-oriented (this is a main difference between the industry and the public sector) the user partner rated the phase of data and documents of high importance (4,33). In comparison with the other phases, interaction components received a low position by the user (3,83) and industry partner (2,33). An explanation for this result could be that interaction components mainly support the other phases and are thus not seen as main IOP activity (nonetheless interaction components play an important role in cooperations because they connect the components of the other phases). The user partner rated the monitoring phase with 4,0 due to the fact, that the cross-organizational analysis and evaluation of the processes and the exchanged data is important to improve the cooperation (e.g. reduce failures and exceptions, increase the transparency of the cooperation, enable a re-engineering). Up to now cross-organizational monitoring has been tackled only by a few initial approaches. This explains on the one hand the high importance for the scientific field (4,5) and on the other hand low prioritization by the industry partner (2,33).

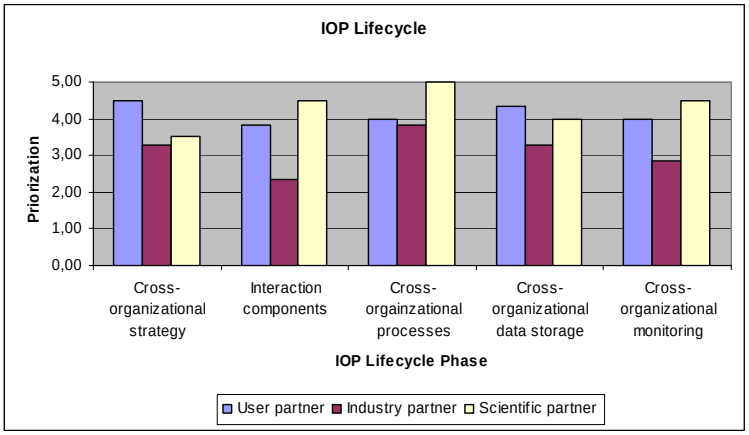


Figure 2 : Prioritization of IOP lifecycle phases

The results of the prioritization regarding the different IOP levels as defined in the EIF are shown Figure 3. As for the average the technical level was classified as most important (4,29). The organizational and technical level received comparable values on average. The user partner rated the organizational level as most important whereas the other levels received as well high values. This could be explained that in the first instance interoperability is seen by the user partner from a business (administration) perspective (4,67). On the other hand the user partner do not only need an organizational solution, but rather a holistic IOP solution regarding as well the other levels (4,33 and 4,5). Because the industry partner focus in general more on the development on products, the semantical (3,88) and technical level (3,63) were classified as more important as the organizational level (3,25). The fact that the semantical level is seen as more important than the technical level by the industry partner can not directly explained. One reason could be that topics like for example semantic web or ontologies are on the top agenda of the industry partner. Due to the fact that in the scientific field topics like Web Services, Service-oriented Architectures or Process-to-Application approaches (e.g. Model-driven Architectures) are getting more and more important, the technical level was ranked to a high position (4,75). The semantical level received a comparable low value (3,25), because one scientific partner is positioned more in the technical security field and ranked the semantical IOP level with a very low value.

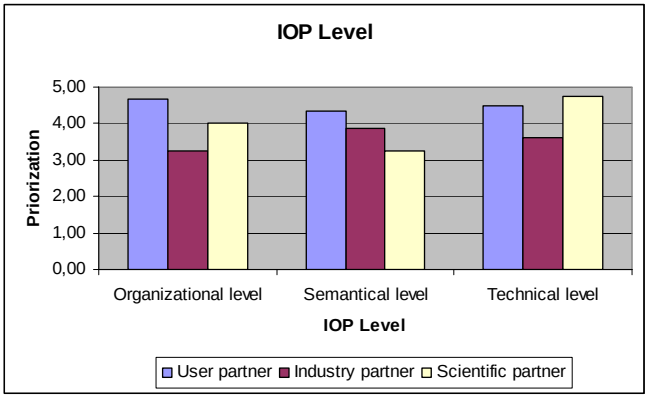


Figure 3 : Prioritization of IOP levels

Synthesis of requirement space

In a first step, requirements were gathered from different sources as mentioned above: requirements identified in current as well as finished IOP activities and developments in the public sector (e.g. EU-funded projects like ATHENA[5], national and regional initiatives and approaches like MODINIS (MODINIS program, 2006) or IOP frameworks like EIF (European Communities, 2004)), requirements from case studies and interviews provided by R4eGov user partners and requirements provided by R4eGov user partners, industry partners and scientific partners on the basis of a questionnaire. The identified requirements were classified according to the IOP levels as defined in the EIF as well as to the different phases of the IOP lifecycle.

Secondly, the R4eGov user partners, industry partners as well as scientific partners were asked to prioritize the set of requirements in view of their organization (e.g. specific use-case, or ICT provider/consultant of IOP solutions). According to table 1 requirements that were judged as "very important" (average value higher than 3,5 of 5) by the R4eGov partners were listed as exemplary shown in following sections (OrgX, SemX, TecX). At the requirements level, the average values are used to indicate their relative significance within the same IOP level. Requirements that are judged to be of high relevance flow directly into the solution space in order to guide the further activities. Regarding the different phases of the IOP lifecycle and the listed requirements, the following (exemplary) synthesis can be made:

- **Cross-organizational strategy:** The listed requirements within the strategy phase illustrate that most of the requirements refer to the organizational and technical IOP level. This indicates that an IOP solution should mainly focus on organizational IOP (e.g. legal framework, Org01) and the technical realization (e.g. enterprise architecture that is based on SOA, Tec04, Tec07) regarding the strategy phase. Semantical requirements are not in the main focus of this phase.
- **Interaction components:** Technical requirements like the use of technical protocols (Tec02, Tec03), web service technologies (Tec06) and the corresponding methods (Tec11) are the main objective within the phase of interaction components. Requirements regarding the organizational IOP level (Org08) and the semantical IOP level (Sem12) should support the technical realization of the interaction components.
- **Cross-organizational business processes:** Regarding the listed requirements the organizational and the technical requirements dominate this group. Most important are methodologies to model cross-organizational processes (Org02) and the consideration of different process types (Org04). On technical IOP level, the execution (Tec01) and synchronization (Tec09) of the modeled cross-organizational business processes are of high interest. The semantical IOP level should support the other levels by a common understanding of the cross-organizational processes (Sem01).
- **Cross-organizational data storage:** The requirements of the semantical IOP level dominate the data and documents phase. The listed requirements illustrate the need for a semantical description of different views (internal and external view, view of the collaboration) of the involved data objects (Sem02), the support of common data object definitions (Sem06) and the development of semantic techniques (Sem05, Sem07) to enable a seamless exchange of the data objects. The requirements of the technical IOP level refer to the use of open standards (e.g. XML). Organizational aspects play a subordinated role.

[5] http://www.athena-ip.org

- **Cross-organizational monitoring:** Organizational requirements (e.g. methods to analyze the critical cross-organizational processes, Org07) and semantical requirements (e.g. methods to analyze the status of document in a collaborative scenario, Sem11) are in the focus of the monitoring phase. The fact that the technical IOP level of the monitoring phase contains no requirements can be explained due to the fact, that cross-organizational monitoring has been tackled only by a few initial conceptual approaches.

Figure 4 shows the results of the evaluation of the requirements regarding the IOP levels.

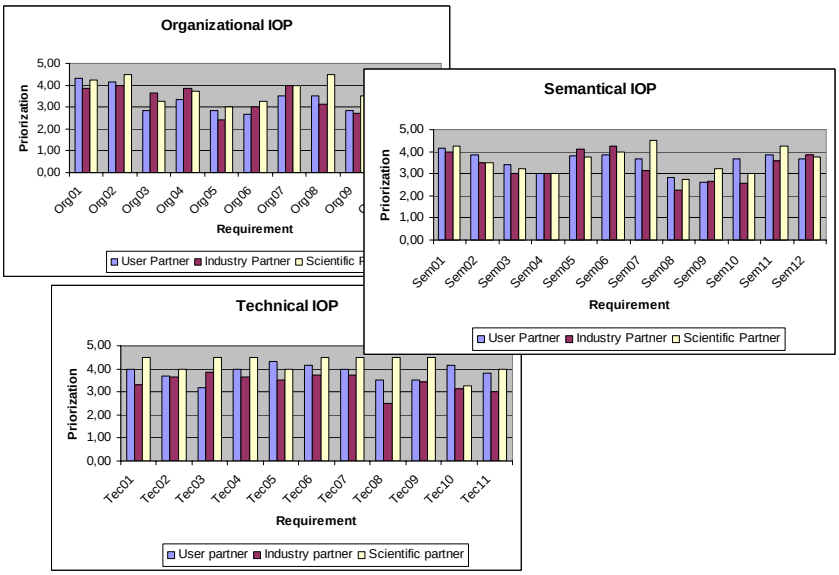


Figure 4: Evaluation of requirements (extract)

Synthesis of solution space

As a recommendation of the solution space it can be estimated that there is a drive to support all phases of the IOP lifecycle, but the focus of each phase regarding the different IOP levels differs. Thus, a high potential can be seen in the development of appropriate methods and tools that satisfy the mentioned IOP needs and requirements. The feedback and the requirements, especially the high ranked requirements, collected within the requirement space serves as the baseline for evaluation activities as well as for ongoing research and development activities within R4eGov in order to ensure that the business needs will be fulfilled by the proposed IOP solution approach and that the R4eGov customer (user partners) see the potential for the approach to be used in daily business. Additionally, the first results of research and development activities are evaluated against the requirements in order to ensure the compliance with the requirement space.

CONCLUSIONS

Rapid advancements in technologies and regular emergence of new legal settings raise new challenges for public administrations. Thus, in recent years the development of interoperable eGovernment systems has gained importance due to the fact that more and more public administrations within Europe are challenged to work together and to adapt continuously to rapid technological changes. To keep pace with rapid evolving economic alterations and to gain a clear understanding of the problems and needs of public administrations for the application of ICT solutions, a suitable evaluation and requirements engineering process is of crucial interest. In this context, we presented a framework that enables a cohesive evaluation and requirements engineering process for eGovernment in the large.

The framework consists of three action domains: 1. the problem space for identifying the relevant objectives, 2. the requirement space for gathering requirements that serve as evaluation basis and 3. the solution space for evaluating and developing appropriate solutions. This framework was motivated and illustrated on the basis of the R4eGov research project. Based on this we described how the framework can be applied within the R4eGov research project to derive and evaluate requirements in different IOP levels and IOP lifecycle phases and demonstrated the transitions between the IOP levels and IOP lifecycle phases.

Future work remains to be done to further refine the proposed evaluation framework and validate its usefulness. Thus, future research should try to apply the framework for other projects and case studies as well as to apply it to different eGovernment scenarios. This could be realized by adapting the problem space, especially the IOP lifecycle dimension that is characteristic for the eGovernment in the large perspective, to other scenarios (e.g. security and/or public key infrastructure solutions for eGovernment, portal solutions for eGovernment). Another point for future research should be the comparison and connection of the presented framework with other evaluation and requirements engineering approaches. Further on, future work should focus on development of an open requirements library in order to make the requirements available for interested requirements engineers and to extend and consolidate the requirements library towards a holistic requirements and evaluation base for different perspectives of eGovernment in the large.

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