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Three dimensions of organizational interoperability

Insights from recent studies for improving interoperability frame-works

Interoperability (IOP) is considered a critical success factor to forge ahead in the online provi-sion of public services. Interoperability frameworks shall give guidance to practitioners what to consider and to do in order to enable seamless interaction with other public authorities and clients. The well known European Interoperability Framework (EIF) and many others are designed as multi-layer models, distinguishing between technical, semantic and organizational IOP. For achieving technical IOP there are acknowledged standards; for semantic IOP recog-nized concepts and methods are available. However, aspects and characteristics of organizational IOP, although considered to be an important success factor for eGovernment projects, are much more heterogeneous and do not provide similar guidance.

This paper suggests that it will be useful to separate this heterogeneous collection of organizational issues into three dimensions. In line with the assignment of standards and protocols to the technical and semantic layer, an additional layer, presently called organizational IOP, should be confined to standards and concepts dealing with the linkage of business processes and be called business process IOP. All other organizational aspects should be conceived as cross-cutting dimensions, as they refer to elements on all layers.

Relevant characteristics of more than 70 good practice cases have been collected within a Study of IOP for the European Commission. Based on these indicators, an empirical taxonomy of settings for achieving IOP at present is developed within an ongoing research project. The proposed classification is presented here in order to invite comments by the IOP community and at the same time is recommended for the discussion about the new draft of the EIF 2.0, issued in July 2008[1].

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Keywords

E-Government, eGovernment, Organizational Interoperability, Governance, IT-Governance, Integration of Information Systems, Centralization, Standardization, EIF, IOP, interoperability frameworks.

> These items shall allow the support of the decisions that had to be taken by public authorities in order to provide for and guarantee interoperation and interoperability.

[1] The EIF v2.0 will take the form of an official Commission position with the publication of a Communication from the Commission to the Council and to the Parliament early 2009.

1 Defining the subject: integration and/or interoperability

There is wide agreement in administrative practice and research that the use of ICT will only lead to savings and improvements if business processes are reorganized in order to allow for a seamless exchange of data between all agencies involved. In many public services, several back-offices are involved in the service-supply-chain. The data processing systems in the back-offices of these agencies have to be merged or linked up in a way to allow for a smooth online service provision across organizational boundaries. However there are legacy systems in these back-offices that do not have the aspired interfaces and are difficult to change because they are linked with other systems and fulfil the local requirements of the respective agency quite well. Reorganization of back-offices cannot start from scratch. There is a need for developing a strategy which may provide a compromise between keeping local systems and still allowing for better data interchange.

In a Study for the European Commission on Back-office Reorganization, about 30 Good Practice Cases have been analyzed and three strategies have been identified. The two basic strategies for coordination, which have been distinguished in organization theory for decades (March & Simon 1958, Kieser & Kubicek 1993), are either centralization of tasks or standardization of processes. As a third intermediate strategy, clearing houses have been identified (Millard et. al. 2004, Kubicek, Millard & Westholm 2007).

In this context, centralization of tasks also means a centralization of data and processing functions, which formerly have been fulfilled separately in different agencies. It requires the physical merging of data from different IT-systems and is also called (data) integration. In the Back-office Reorganization Study it turned out that high savings could be achieved by public services that have realized full or almost full integration of back-offices via centralization. However, as centralization of tasks of formerly separate agencies means changes of authority and jurisdiction, this only happened when there was strong political pressure because of obvious inefficiencies, delays and backlogs.

An alternative option is the standardization of processes. Electronic Data interchange becomes possible if different agencies strictly follow the same procedure and use the same data formats. In the cases of linking IT systems in different agencies in an interorganizational information system, this does not necessarily mean that internal processes, data formats and processing functions have to be standardized, but only the interfaces at the boundaries of each local system and the content and format of the data to be exchanged. Instead of integrating the separate systems into a new one, they can be kept running and only be adapted in order to provide for their interoperation via import and export interfaces. Therefore, we may speak of interoperability via standardization. Scholl & Klischewski (2007) suggest distinguishing between “interoperability” (IOP), as the ability to allow for data exchange, and “interoperation”, as the practical achievement.

In principle, interoperation could be achieved by direct multilateral data exchange according to the same standards by all agencies involved. However, in practice, very often intermediaries are involved, providing certain support such as directory or data conversion services. Of course, all participating agencies could run their own directories with the addresses of all partners. But obviously the cost for updating is lower if this is done only once for all participating units via a central directory. Following the terminology in the banking industry, such intermediaries have been named clearing houses in the Back-office Study. Contrary to the centralization by data integration, where primary tasks and responsibilities for e-services are centralized, the primary tasks and responsibilities remain unchanged and only secondary, supportive functions are centralized by outsourcing them to one or more service providers.

To sum up, efficient electronic public services depending on the cooperation of two or more agencies can either be achieved by centralization of tasks and integration of data or through achieving interoperation by standardization of interfaces and data formats, frequently realized with the help of intermediate agencies called clearing houses providing limited supporting secondary services for achieving interoperation. This means that IOP is one of at least two different strategies to enable high quality and highly efficient eGovernment services across organizational boundaries, which comes on the agenda when centralization of tasks is legally not possible, politically not feasible or not the best option because of other risks.

This basic distinction shall be illustrated by two examples from a study on IOP for the European Commission within the MODINIS program (Tambouris et. al. 2007), where the authors also were involved in. In Austria and in Germany, citizens have to register in the local community where they live. When moving to another local

community, they have to deregister in their old community and register in the new one. With the introduction of electronic citizens' registers this did not change for some time. Each local community had ordered their own system. In Germany there are about 5,400 local citizens registers operated on at least 17 different software products. In such a heterogeneous environment, a request of official address information to localize a certain citizen is difficult to fulfil, and obviously there is a double burden by completing two forms with almost identical content in the case of moving. Therefore, projects where launched in both countries to improve the services of address verification and change of address. For several reasons both countries decided to go different ways. In Austria the national government decided to set up a central national citizens' register and committed all local registers to deliver their data or to use the central register, instead of their local one free of charge. In Germany this was not possible at that time because the citizen's registration was in the jurisdiction of the 16 Länder under coordination of the Federal Government, and there were strong privacy concerns. Therefore the Federal Government in Germany decided to use a coordinating authority to establish a standard for data exchange between the local communities and standard procedures for services such as address verification and change of address. This X-Meld standard was finally established in a conference of the 16 state ministers of Interior and the Federal minister and enacted in a directive, which only demands the implementation of an interface of the local or regional system which can receive and send messages according to the X-Meld standard[1].

According to the terminology introduced in this paper, the Austrian case of establishing a central register is not a case of IOP, but of integration, while the German case is a true case of establishing IOP between more than 5,400 local systems by enacting the X-Meld standard for multilateral data exchange.

This understanding of IOP is in line with the definition adopted by the European Commission and the European Interoperability Framework which defines IOP as "the ability of information and communication technology (ICT) systems and of the business processes they support to exchange data and to enable sharing of information and knowledge" (IDABC 2004).

2 Basis, objective and outline of this analysis

Both strategies require complex and difficult measures, which may be quite different. This paper will only focus on how IOP has been achieved and is maintained in a number of good practice cases collected in the aforementioned MODINIS IOP Study (Tambouris et. al. 2007, Archmann & Kudlacek 2008). More than 70 case descriptions have been made available in an online database[2]. For 32 of these cases, extensive descriptions have been produced in cooperation with the case owners and been published on the Good Practice Framework for E-Government of the European Commission[3]. Further analysis of these cases is subject of a research grant provided by the German Research Foundation (Deutsche Forschungsgemeinschaft), started in May 2008.

Whereas IOP is mostly treated as a technical issue of developing or selecting the appropriate technical standards, the MODINIS IOP Study also aimed at identifying barriers and success factors of achieving IOP. While, within the available scope of time and funds, the study could only summarize insights from the cases, the research project aims at an empirical taxonomy based on operational indicators. So far, there are neither appropriate analytical nor empirical classifications of different approaches toward establishing and maintaining IOP. But there are IOP frameworks developed to provide some guidance and to classify different problems that arise, when striving for IOP. They mainly concentrate on what has to be made interoperable and by which technical means, i.e. standards, by distinguishing different layers of IOP, e.g. a technical, syntactic, semantic and organizational layer.

Compared to the other IOP layers, the aspects and characteristics of organizational IOP are the less systematized, although regarding to barriers and success factors many experts agree that organizational IOP constitutes the biggest challenge for the successful implementation of interoperable multi-level eGovernment systems (see for example a survey on information needs regarding IOP within the MODINIS IOP Study, Kubicek & Cimander 2005).

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[1] see http://www.egov-iop.ifib.de/case_description.php for the two cases
[2] http://www.egov-iop.ifib.de
[3] http://www.epractice.eu/cases

In several IOP frameworks organizational IOP serves as a container for many different issues, which could not be clearly assigned to the other layers, thus mixing different dimensions and not really providing guidance. It is the objective of this paper to contribute to an improvement of IOP frameworks and the orientation they provide by distinguishing three dimensions of organizational IOP, which are based on operational indicators and allow for an empirical classification and comparative analyses of good practice cases. This paper starts with a review of different IOP frameworks in order to define what has to be made interoperable and then argues that present definitions of the layer of organizational IOP should be confined to technical standards for linking workflows and business processes, while all other organizational aspects should be assigned to two other cross-cutting dimensions which do not only apply to the layer of organizational IOP, but to the other layers as well, and which deal with the “Who” and “How” of achieving interoperability and interoperation, i.e. an actor perspective. We may also speak of three different but complementary views. As it will be explained in more detail in the following sections, we will call them political governance and IT governance of IOP.

For these two cross-cutting organizational dimensions, characteristics and empirical indicators have been derived from the MODINIS IOP Study’s good practice cases and are proposed for an empirically assessed taxonomy, on which future comparative research could build and investigate, which institutional arrangements have been chosen for achieving IOP of different services or for similar services in different countries. At the present stage of research, the selection of indicators and their operationalization is presented in order to receive feedback by the expert community regarding plausibility and usefulness. Therefore comments to this paper are highly welcome and will be considered in the ongoing research heading for a refinement of the classification presented here (e.g. in a Community on the ePractice.eu portal?).

3 Review of selected interoperability frameworks

The European Commission has launched a Communication with particular focus on IOP for pan-European eGovernment services (CEC 2006a). But IOP is also of great importance for the eGovernment development in each Member State. The periodic benchmarking study of eGovernment in Europe explains differences of progress between Member States to a large extent by differences in achieving IOP between different government levels (CEC 2006b, 2007).

The European Interoperability Framework for Pan-European E-Government Services (EIF) developed within the EU program IDABC (Interoperable Delivery of European E-Government Services to Public Administrations, Business and Citizens) (IDABC 2004) has established itself as a reference model for several national IOP programs of Member States. At present it is under review and a new version has been drafted for discussion in July 2008 (European Communities 2008). Similar to the EIF, there are IOP initiatives, frameworks or programs within the eGovernment plans of most Member States. They are summarized in the MODINIS IOP Study mentioned above (Tambouris et al. 2007). Several international bodies have developed interoperability frameworks as well (see Peristeras & Tarabanis 2006).

An IOP framework shall fulfil several purposes. It shall list measures or options that are suitable and necessary to create IOP among separated information systems. In a pragmatic aspect, it shall support the practical planning of systems for several administrations by listing the topics that have to be coordinated and the suitable standards and methods. Thus a communication basis for the developers is created. At the same time, it allows the allocation of tasks. In other words, it gives structure to a complex field, provides common terminology where similar things are termed differently and suggests a classification in order to recognize similarities and differences. This is mainly achieved by assigning different standards for data exchange to three or four different layers of IOP:

- The European Interoperability Framework (EIF) differentiates the three layers of technical, semantic and organizational IOP. The draft of the second version adds the layers of legal IOP and the political context (European Communities 2008).
- In a similar architectural model, the European Public Administration Network (EPAN) adds the layer of structured customer contact and support and, besides the four layers, introduces the aspect of governance as a cross-cutting issue (EPAN 2004).
- In a white paper with the title "Standards for Business", the European Standardization Institute ETSI introduces the layer of syntactic IOP between the technical and the semantic IOP (ETSI 2006).

While the MODINIS IOP Study adopts the three layer classification of the EIF, we propose to pick up the ETSI distinction between a technical and a syntactic layer because regarding to institutional settings there are significant differences between the two.

Considering the purposes of IOP frameworks to provide guidance for achieving IOP, the classification of different layers is necessary, but by far not sufficient step, because it only refers to “What” has to be made interoperable by which technical means, but not “How” these standards are established and implemented and “by Whom”; i.e. the actor or governance perspective is missing. And even regarding the “What” present knowledge about standards on the four layers is quite different (cf. Table 1).

Table 1. Four Levels of Interoperability

Layer of IOP	Aim	Objects	Solutions	State of Knowledge
Technical IOP	Technically secure data transfer	Signals	Protocols of data transfer	Fully developed
Syntactic IOP	Processing of received data	Data	Standardized data exchange formats, e.g. XML	Fully developed
Semantic IOP	Processing and interpretation of received data	Information	Common directories, data keys, ontologies	Theoretically developed, but practical implementation problems
Organizational IOP	Automatic linkage of processes among different systems	Processes (workflow)	Architectural models, standardized process elements (e.g. SOA with WSDL, BPML)	Conceptual clarity still lacking, vague concepts with large scope of interpretation

While technical and syntactic IOP deal with established standards such as TCP/IP and EDIFACT or XML developed and issued by international standards organizations, for semantic IOP there are concepts and methods available, but which are not yet standardized, and for organizational IOP it is by far less obvious what has to be standardized, who could develop and establish appropriate standards, and what is necessary for their operation and maintenance. Some requirements for organizational IOP, in particular in B2G and G2G relations, are defined in the ICT Industry Recommendations to the EIF (Computing Technology Industry Association 2004).

The following box quotes the definitions of organizational IOP in selected frameworks. Compared to the layers of technical and semantic IOP, for organizational IOP

- the definitions are much more heterogeneous,
- the assigned issues are much more vague,
- there are almost no classifications of options available for solving these issues.

One can get the impression that the layer of organizational IOP is filled with all those issues, which turns out to be necessary after IOP has been achieved on the other layers below.

Definition of organizational IOP in different framework concepts

IDABC EIF v.1.0

Organizational interoperability is concerned with "defining business processes and bringing about the collaboration of administrations that wish to exchange information and may have different internal structures as well as aspects related to requirements of the user community" (p. 16).

IDABC EIF draft of v.2.0

Organisational interoperability concerns a broad set of elements of interaction, including business processes, business interfaces such as email, web portals, etc., business events within and between administrations, and "life" events, involving the external parties: businesses and citizens. This aspect of interoperability is concerned

with how different organisations such as different Member State Administrations collaborate to achieve their mutually beneficial, mutually agreed eGovernment service-related goals. The partners need to reach detailed agreements on how their processes will interact (synchronize and cooperate) in order to deliver “public services where needed”.

Organisational Interoperability in practice means the seamless integration of business processes and the exchange of information that they manage between the organisations. (from EIF v1).

Organisational Interoperability aims at addressing the requirements of the user community by making services available, easily identifiable, accessible and user-oriented. Organisational interoperability occurs when actors agree on the why and the when of exchanging information, on common rules to ensure it occurs safely, with minimal overhead, on an ongoing basis, and then draw up plans to do all these things, and carry them out.

EPAN

Organizational interoperability "is concerned with the coordination and alignment of business processes and information architectures that span both intra- and interorganisational boundaries. Coordination of business processes across organisational boundaries is essential if a single, aggregated view of a service from the customers' perspective is to be achieved. It is suggested that administrations could develop an exemplar scheme that would define standard approaches to each of the main requirements of any public service and use this exemplar to benchmark all other services; that common functionality could be provided on a shared basis through a broker service to reduce development, deployment and operational costs to the public administration and to each service fulfilment agency, and to ensure consistency of experience for users of services across all agencies in the public sector through the use of agreed standards across all services; that expenditure reviews could be undertaken to ensure that financial priority is given to those schemes that comply with the structured customer support services set out above and with interoperability standards; and that each administration could develop a central programme of organisation development assistance and funding to bring this change about" p. 5/6.

ETSI

"Organisation interoperability, as the name implies, is the ability of organisations to effectively communicate and transfer (meaningful) data (information) even though they may be using a variety of different information systems overwidely different infrastructures, possibly across different geographic regions and cultures. Organisational interoperability depends on successful technical, syntactical and semantic interoperability" (p. 6).

The definitions of organizational IOP mix methods and standards for the technical linkage of business processes (process organization) with questions of the organization of support functions, which cannot be assigned to one layer only, but which apply to all layers. With the more differentiated definition of organizational IOP in the draft of the new EIF v. 2.0 this break of systematization has not changed, but rather even increased by adding the layers of legal IOP and political context on top - which obviously touches issues on all other layers.

4 Distinguishing three organizational views

As mentioned, the EPAN framework provides greater conceptual clarity by separating the dimension of governance and considering this aspect as a cross-cutting issue concerning all layers (EPAN 2004). Also, the ICT Industry Recommendations to the EIF (Computer Technology Industry Association 2004) differentiate between those aspects that are based on legislation, regulations and court findings on the one side and the technical and functional aspects of IOP on the other.

In other words, different but complementary views are introduced referring to "What” is standardized on one side and “Who” develops and establishes these standards, as well as “How” operation and maintenance of IOP standards is organized on the other side. This “Who” and “How”-perspective, called “governance” in the EPAN framework, however still covers different aspects which need further differentiation.

The EPAN framework defines Governance of Interoperability as being “concerned with the ownership, definition, development, maintenance, monitoring and promotion of standards, protocols, policies and technologies that make up the various elements of an interoperability architecture” (EPAN 2004, p. 11). It emphasis the need for coordination of all government agencies within a Member State in order to overcome

insular views, to reduce cost and to enable new and innovative ways of working across organizational boundaries. The framework, heavily influenced by the Irish IOP Framework, suggests that ideally the technical and semantic IOP standards should be governed under the authority of one single agency in a Member State while the responsibility for the different issues of organizational IOP, according to the government structure in a Member State might be assigned to different agencies. This is a very particular proposal which is not feasible in all Member States and does not cover the whole range of governance forms usually subsumed under this heading (e.g. hierarchies, markets and networks), while at the same time mixing the political issue of institutional settings, where standards are developed and how they are established or enacted, with issues of implementing these standards by providing certain IT-services. We therefore suggest to separate these two views. The institutional aspect neatly fits to the established understanding of governance. But there is also a debate under the heading of IT-governance dealing with issues of management of IT-infrastructure and services. We propose to capture both subjects by distinguishing between political governance and IT-governance or an institutional and an IT-service view.

"What" has to be standardized: The functional view

In line with the definitions of technical, syntactic and semantic IOP which are confined to technical and functional standards, this aspect of what so far is called organizational IOP should also be restricted to technical and functional standards for the multilateral alignment of business processes across organizational boundaries, i.e. standards for process modelling, architectures or choreographies. By building upon or including technical, syntactic and semantic standards they finally allow the seamless networking between different ICT systems. A prominent example are Service-Oriented Architectures which, by using standardized business process definition languages allow the common description of interorganizational processes, e.g. web services defined in WSDL (Web Services Definition Language) or BPML (Business Process Modelling Language). In order to avoid misunderstandings because of the multiple use of the attribute "organizational" we suggest to name this layer "Business Process IOP".

Political Governance: The Institutional View

Standards for IOP are established in different organizational setting and by different institutional means. There is not one common governance structure for all layers of IOP. Protocols at the technical layer are mostly defined by national and international standardization committees, including Internet working groups, while data formats, ontologies and so forth for creating semantic IOP are - due to their more concrete relation to a particular context - mostly developed by industrial or sectoral organizations (industrial associations, professional bodies, local government associations, etc.). They are either negotiated by the administrations directly concerned or by superior administrative agencies, or established by ordinance or legislation.

IT-Governance: The IT-Service View

Once standards are developed and their implementation has been decided, a lot of questions remain of how to organize and manage for the effective operation and maintenance of the data exchange. When analyzing ordering and billing between industry and retailing we found that ordering and billing information between retailing and producers of brand articles is not exchanged directly, but via Value Added Networks with intermediaries providing certain services such as conversion of data formats, providing up-to-date directories, authentication or authorization services and many more. They can be called clearing houses, generalizing from the inter-bank clearing (Kubicek 1993). For some time standards have been developed to assess IT-services: ITIL (Information Technology Infrastructure Library) and CObIT (Control Objectives for Information and related Technologies) provide criteria for assessing the quality and maturity of the IT-service management. IT-service management in turn is conceived as one field of IT-governance (for an up to date discussion of IT-governance in relation to e-government see the contributions to the IT-governance Community on the ePractice portal[4].

To summarize this discussion, we suggest distinguishing three organizational dimensions or views of IOP. They highlight different kinds of measures that have to be taken whenever IOP has to be achieved for an eGovernment service provided by two or more agencies.

[4] http://www.epractice.eu/community

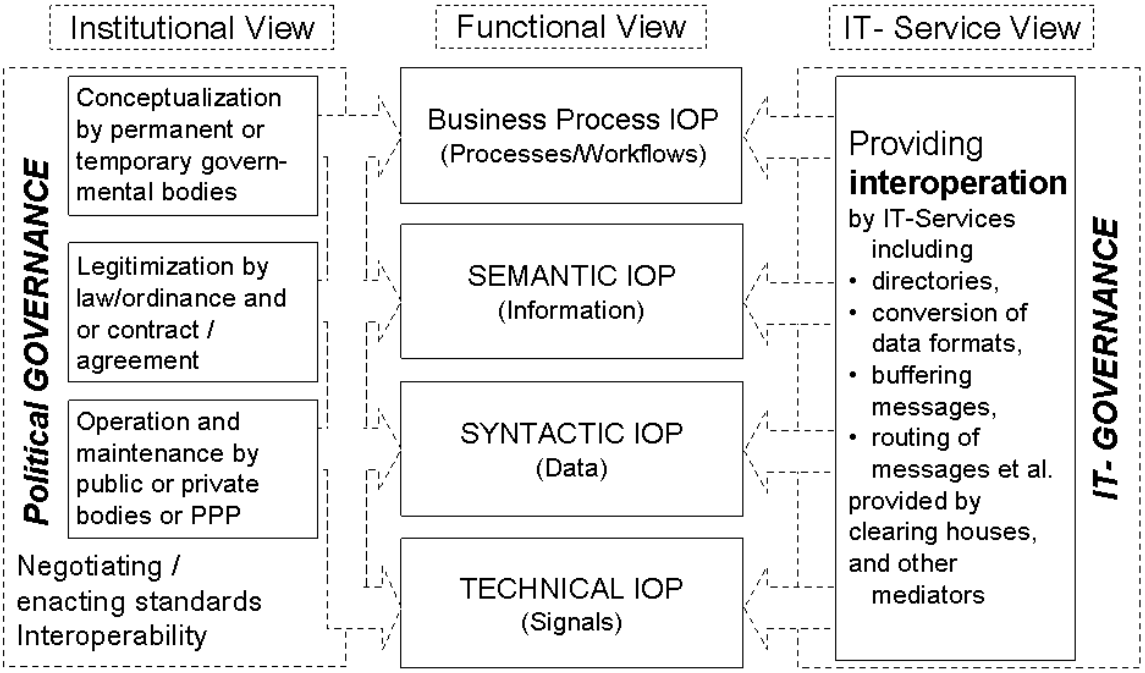

Figure 1. Layers of Interoperability, their Governance and Provision

In the next two paragraphs we will propose sub-dimensions and empirical indicators, derived from the MOIDINIS IOP Study's good practice case collection in order to differentiate relevant aspects and available options.

4.1 The Political Governance of Interoperability

As mentioned, the EPAN framework introduces the governance of IOP as a separate cross-cutting issue, but in a very special way, and does not cover the whole range of different government forms. The MODINIS IOP Study mentions the three basic forms of governance: market, hierarchy and networks, but does not illustrate how these may be applied in the particular context of governance of IOP for eGovernment services. Looking at the IOP discussion and literature in general there is no classification available on the different arenas where particular semantic and organizational interoperability have been negotiated and decided. Some hints can be found in the TERREGOV organizational case studies (Bousson & Keravel 2005). There is some research on intergovernmental cooperation for achieving interoperability (see Scholl & Klischewski 2007 for an overview) which is mostly case-based, with a strong focus of integrating information systems and does not provide a classification of the different forms of governance for achieving semantic and organizational interoperability. Therefore our research project adopts an inductive approach, looking for patterns in the collection of good practice cases.

When looking for market, hierarchy or network-like patterns in the 32 detailed case descriptions in the MODINIS IOP Study we found that there was not only one governance structure in each case. The planning and decision-making authority rather shifted in the course of three different phases of the development process.

In a conceptualization phase we found working groups and ad hoc committees as well as staff units, mainly composed of experts from the respective application contexts and ICT specialists. The organizational forms in this phase can be distinguished by the degree of institutionalization and representation. Sometimes the IOP standards at the organizational and semantic level are elaborated in existing permanent institutions, sometimes by ad hoc groups put together for a particular IOP project. Representation refers to the extent to which the different sectors or levels of government, which will be affected by a standard, are represented in

the respective working group, including providers, suppliers and operators. There could be either no representation of such concerned agencies, the representation of selected pilot or of all concerned agencies.

Table 2. Degree of Institutionalization

	Existing institution	New institution
Permanent	e.g. national Ministries in the e-enabled child benefit service in Ireland	e.g. Crossroads Bank for Social Security in Belgium
Temporary (ad hoc group)	e.g. the working group EDIAKT II in the standardized e-form exchange project in Austria	e.g. the OIO Data Standardization Committee in OIO-XML project in Denmark

Table 3. Degree of Representation

Representation degree	No participation of users	Participation of selected pilot users	All user groups represented

Standards elaborated by such working groups are in most cases proposals, which have to be adopted, issued, recommended or made mandatory by authorized bodies. They need legitimization by law or ordinance, contract or agreement or just by the decision of an authorized and recognized board. In contrast to e-business, in the 32 European cases, almost all semantic and organizational IOP standards for nationwide services have been established by law or ordinance, while on the regional level contracts or agreements were most frequent.

Table 4. Legitimacy and Authorization of Standards

	Mandatory (Obligation)	Voluntary (Recommendation)
Law, Ordinance	e.g. use of the X-Meld standard in Civil Registration in Germany	e.g. integration with the CBSS for social security benefits in Belgium
Agreement, Contract	e.g. use of RTA2 forms in the Road Traffic Accident project in UK	e.g. OIO-XML standards in Denmark

In a third phase, standards, which have been recommended or made mandatory, still have to be implemented and put into operation by assigning certain tasks to certain organizations or units. They can be public or private or public-private partnerships. In many cases tasks of control or supervision are assigned to boards or committees, in particular for promotion, diffusion, maintenance and updates of the respective standards, while tasks of operation are assigned to governmental agencies, joint ventures or private enterprises as service providers.

Table 5. Organization of Maintenance and Operation of Standards

	Public	Private	PPP
Maintenance	e.g. KoopA ADV for the X-Meld standard in Germany	e.g. the Danish Bibliographic Centre in Bibliotek.dk project	e.g. e-invoice consortium in Finland
Operation	e.g. KoopA ADV for the X-Meld standard in Germany	e.g. e-invoice service providers in Finland	e.g. eID card service providers in Estonia

4.2 IT Governance for Interoperation

Once standards have been enacted they have to be implemented and put into operation. This is usually done by defining certain IT-services which support the primary eGovernment services, such as directory or format conversion services, and by looking for appropriate service providers within government or on the IT-service market. In this respect the same coordination problem arises as for the primary eGovernment services mentioned at the beginning of this paper. Decisions have to be taken about the most effective and efficient degree of centralization and standardization. So far there is no classification or listing of what might be

centralized and standardized in order to provide interoperation, respectively which kind of services should be provided for achieving this purpose.

Again by adapting an inductive approach we looked at the MODINIS IOP Study's good practice cases for what is standardized and what is centralized in interorganizational data exchange networks and we identified the following provisions for interoperation:

1. standardized directories (same directory is available in each involved unit) providing the address data for routing,
2. standardized data exchange formats on the syntactic layer,
3. standardized data keys or ontologies on the semantic layer,
4. common workflow definitions to describe the source and target processes of the exchange.

In order to support the application of these standards, we find intermediary units, which serve as central service providers for

1. the routing of messages via a central directory,
2. the conversion of data exchange formats,
3. providing access to files of selected (master) data,
4. maintenance of directory data,
5. workflow control (e.g. process control, validation, quality control, tracking and tracing).

It is obvious that in all cases, where messages are exchanged between different organizations, some kind of routing is necessary based on directories to find and determine the target address. Instead of each participating organization individually maintaining such a directory, it is much more efficient to have one central provider who maintains and updates this directory. In order to exchange data between automated processes, there is also a need to define the source and target workflow as well as data exchange formats. Examples are applications for social benefits, notice of change of address or invoices. In some cases, standardization covers the syntax of the messages, e.g. XML schemes for an order; in other cases the meaning of certain data fields is standardized as well, e.g. a unique citizen or business number in an application form or a unique article number in an order or invoice. Again, a central unit may maintain a database with this kind of reference data more effectively. And if there are several formats, it may provide a conversion service as well. So the different elements are not necessarily alternatives but may build on each other.

To adopt the view of IT-governance and IT-service management leads to considering an additional sub-dimension dealing with the maturity level of IT-service management which deals with the precision of service definitions, support and service levels among others.

5 Reflecting the usefulness of the operationalization

At this moment the cases are analyzed and assigned to the operationalized subdimensions of IOP. Thus a descriptive empirical distribution can be generated. Criteria for the quality of such a taxonomy are the exclusiveness of the values attributed and the reliability of the assignment, i.e. whether different reviewers assign the same attributes to a particular case.

From a pragmatic point of view, there is the question whether the presented three dimensions of organizational IOP reflect reality and whether the classifications and kinds of measures on each of the dimensions cover the relevant items. These items shall allow the support of the decisions that had to be taken by public authorities in order to provide for and guarantee interoperation and interoperability. Are there other measures, which should be considered? Are they still too general and should be further differentiated?

From a scientific or analytical point of view, there is the question whether this classification allows to identify certain patterns and relations. One question regarding this aspect is whether there is an order of the various kinds of actions on each of the two sub-dimensions of interoperation (centralization and standardization). Do

they have a cumulative structure, i.e. is there a rank order according to which a measure ranked higher only appears where all the measures ranked lower exist as well?

The analysis of these relationships between different measures and the search for patterns, as well as the examination of the different governance aspects, is subject of an ongoing research process which started in May 2008. We would like to discuss the concept of the three organizational dimensions of interoperability and the suggested operationalization with the expert community, either to receive support for building the analysis of these propositions or to get suggestions for changes in order to better meet the information needs of those working on IOP and to whom the interoperability frameworks should provide guidance and support.

Concerning the recently published draft of the EIF 2.0, we suggest rethinking the basic structure with the organizational and legal IOP on top of the technical and semantic IOP and to adopt the distinction between the cumulative layer structure and the cross cutting dimensions of political governance and provision of interoperation (IT-governance).

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