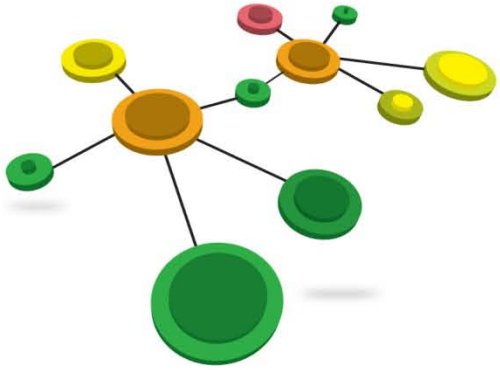

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# EU-level policy and practice in the field of eGovernment interoperability

WP 2: Research on EU Policy and Practices

Publication date (final version): 30.09.2012

LEONARDO DA VINCI - MULTILATERAL PROJECT
ELGI - eLearning for eGovernment
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EACEA Education, Audiovisual & Culture Executive Agency

Education and Culture DG
Lifelong Learning Programme

Education and Training

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State-of-the art international report

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## ABBREVIATIONS

| | | |
|---|---|---|
| EC | – | European Commission |
| EIA | – | European Interoperability Architecture |
| EIF | – | European Interoperability Framework |
| EIIS | – | European Interoperable Infrastructure Services |
| EIS | – | European Interoperability Strategy |
| EU | – | European Union |
| HM | – | Horizontal Measure |
| ICT | – | Information and Communication Technology |
| IT | – | Information Technology |
| MS | – | Member State |
| MoU | – | Memorandum of Understanding |
| NIF | – | National Interoperability Framework |
| NIFO | – | National Interoperability Framework Observatory |
| OSS | – | Open Source Software |
| PA | – | Public Administration |
| PCI | – | Projects of Common Interest |
| PSC | – | Point of Single Contact |
| RIA | – | Reference Interoperability Agreement |
| SLA | – | Service Level Agreement |
| SOA | – | Service-oriented Architecture |

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## INTRODUCTION

Interoperability is one of the hottest topics at the level of the European Union (EU) during the last decade, because it is crucial for achieving European integration and concerns core aims of the EU [1].

According to Maroš Šefčovič, the European Commission (EC) Vice-President:

> *"The European Union is about cooperating to create an environment in which citizens and businesses can thrive. European public administrations have to lead the way in working together. This cannot happen without real, effective interoperability between public administrations at all levels."* [2]

The agreed vision statement on interoperability which was presented in the final report on the first phase of preparing of the European Interoperability Strategy (EIS) is that:

> *"In 2015, interoperability has significantly fostered European public service delivery through:*
>
> - *appropriate governance organisation and processes in line with European Union policies and objectives;*
> - *trusted information exchange enabled by commonly agreed, cohesive and coordinated interoperability initiatives, including completion of the legal environment, development of interoperability frameworks, and agreements on interoperability standards and rules."* [3]

Action on interoperability is essential to maximize the social and economic potential of information and communication technology (ICT), and the Digital Agenda, one of the EU initiatives related to delivery of sustainable economic and social benefits from the creation of a single digital market, can only take off if interoperability based on standards and open platforms is ensured [3].

Taking this context into account and bearing in mind that there are a huge number of legal documents and ongoing intensive efforts in establishing of interoperability, there is a need for a system for acquiring corresponding knowledge by target groups directly or indirectly involved in development of eGovernment in the EU.

The Leonardo da Vinci multilateral project "ELGI- eLearning for eGovernment" (Uhttp://www.elgiproject.eu) which started in 2011 aims at development of an e-learning course for delivering knowledge concerning interoperability. The report presents results of the activities of the second workpackage which is related to study of publicly available documents constituting EU policy and practices in the area of interoperability.

The report is organized as follows. Section 1 is devoted to eGovernment, its strategic focuses, maturity model, and benefits. Section 2 introduces the concept of interoperability by paying attention to its definition, types, interaction scenarios, examples of services, benefits, beneficiaries, and initiatives. Section 3 specifies the current political context. Section 4 provides historical context of documents, events, and initiatives in the area of interoperability. Section 5 considers key elements of interoperability. Section 6 describes the past and present EU programmes concerning development of public services and promotion of interoperability. Section 7 pays attention to recent large scale pilot projects.

# 1. EGOVERNMENT

eGovernment in Europe started to evolve actively since the beginning of the current century. In 2001 [4], the European Ministers - Ministers of EU Member States (MSs), European Free Trade Area Countries and countries in accession negotiations with the EU - responsible for eGovernment stressed that eGovernment is an integral part of the Lisbon strategy for growth and employment [5] and of the eEurope 2002 Action Plan [6] and re-affirmed their commitments to rapid eGovernment developments in Europe.

Two years later, the Ministers

> *"acknowledged the role of eGovernment as a driver for the modernization of the entire European public sector and as a key in increasing productivity and efficiency of Public Administration, thereby freeing resources and delivering more value for taxpayers money."* [7]

In 2007, in its turn, they recognized that

> *"eGovernment is becoming mainstream as most policies at EU or national level require an ICT solution in their implementation."* [8]

In the context of the EU, eGovernment is understood as the use of ICT in public administrations (PAs) combined with organizational change and new skills in order to improve public services and democratic processes and strengthen support to public policies [9]. Organizational change is related to rethinking of structure, processes, and behaviour of institutions of PA due to new ways of doing their work.

In general, eGovernment has the following strategic focuses [9]:

- the achievement of the Lisbon goals [5] of becoming the most competitive and dynamic knowledge-based economy in the world;
- reduction of barriers to the internal market for services and mobility across Europe;
- effective implementation of national policies and regional or local development.

According to [10], eGovernment maturity model includes four levels (Figure 1.1):

- level 1 – simple website containing online information about public policies and administrative procedures, but there is little or no change in the nature of the interaction of external stakeholders with the institution;
- level 2 – online government implemented through simple electronic interaction mechanisms (like e-mail or web-based forms) in an effort to provide better services to customers;
- level 3 – integrated government when parts of administrative activity are automated, but some steps in administrative workflows are still paper-based. Moreover, the services offered are not based on existing procedures that are simply revamped to use ICT but are the product of a genuine integration between interaction channels, back office information systems, and administrative processes;
- level 4 – transformed government when administrative activity is completely automated end-to-end, crossing organizational boundaries. Services are built up from the viewpoint of internal and external users, rather than based on the organisation's set-up, so as to maximise user satisfaction through better quality and more transparency while also increasing efficiency.

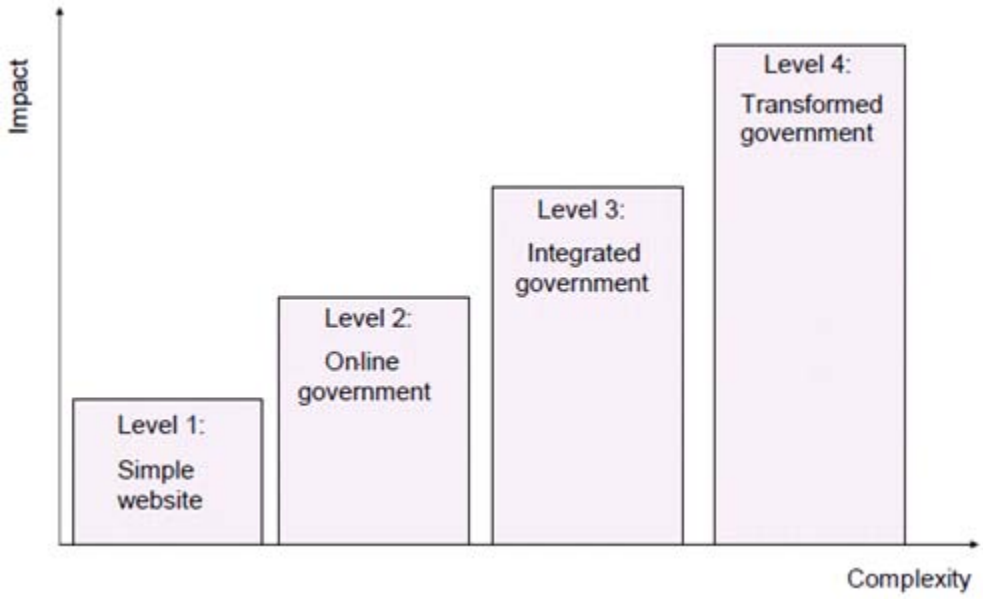



Figure 1.1. The eGovernment maturity model (adopted from [10])

Effective eGovernment and well-implemented public services [9, 11]:

- involve rethinking organisations and processes and changing behaviour so that public services are delivered more efficiently to the people who need to use them;

- enable all citizens, enterprises, and organisations to carry out their business with government more easily, more quickly, and at lower cost;
- improve governance and enable citizens to become more involved in the activities of their governments;
- help the MSs to achieve fundamental political objectives, such as improving social inclusion and building a more competitive enterprise sector;
- improve the development and implementation of public policies;
- help the public sector to cope with the conflicting demands of delivering more and better services with fewer resources.

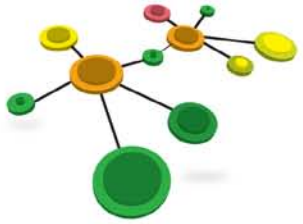
Therefore, eGovernment is an enabler to realise a better and more efficient administration [9].

In [9], it is pointed out that:

> *"eGovernment enables the public sector to maintain and strengthen good governance in the knowledge society. This means:*
>
> 1. *A public sector that is open and transparent: governments that are understandable and accountable to the citizens, open to democratic involvement and scrutiny.*
> 2. *A public sector that is at the service of all. A user-centred public sector will be inclusive, that is, will exclude no one from its services and respect everyone as individuals by providing personalised services.*
> 3. *A productive public sector that delivers maximum value for taxpayers' money. It implies that less time is wasted standing in queues, errors are drastically reduced, more time is available for professional face-to-face service, and the jobs of civil servants can become more rewarding.*
>
> *In short, eGovernment is helping to establish a more open, inclusive and productive public sector, in line with good governance. This is the pre-condition for a public sector that is prepared for the future."*

EU legislation impacting the overall development of eGovernment can be considered in several categories [12]:

1. Data Protection/Privacy:




"Directive 95/46/EC of the European Parliament and of the Council, of 24 October 1995, on the protection of individuals with regard to the processing of personal data and on the free movement of such data". The directive is intended to remove obstacles to free movement of data without diminishing the protection of personal data. It is developed to ensure that all citizens have equivalent protection across the EU. The directive applies to any operation or set of operations which is performed upon personal data, called processing of data (collection of personal data, its storage, disclosure, etc.). It applies to data processed by automated means (e.g. a computer database of customers) and to data that are part of or intended to be part of non-automated 'filing systems'. The data protection directive does not apply to data processed for purely personal reasons or household activities, as well as either to areas such as public security, defence, or criminal law enforcement.

- "Directive 97/66/EC of the European Parliament and of the Council, of 15 December 1997, on the processing of personal data and the protection of privacy in the telecommunications sector". It states that MSs must guarantee the confidentiality of communication by means of national regulations. Any unauthorised listening, tapping, storage, or other kinds of interception or surveillance of communications is illegal.

2. eCommerce:
   - "Directive 2000/31/EC of the European Parliament and of the Council, of 8 June 2000, on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market (Directive on electronic commerce)". The directive sets up the basic legal framework for electronic commerce in the internal market. It removes obstacles to cross-border online services in the EU and provides legal certainty to businesses and citizens alike.
3. eCommunications:
   - "Directive 2002/21/EC of the European Parliament and of the Council, of 7 March 2002, on a common regulatory framework for electronic communications networks and services (Framework Directive)". The aim of this directive is to establish a harmonised framework for the regulation of electronic communications networks and services. It contains horizontal provisions serving the accompanying Directives, such as scope and general principles, basic definitions, general provisions on national regulatory authorities, the new concept of significant market power and rules for granting certain essential resources, such as radio

frequencies. The framework covers all electronic communications networks and services, such as fixed line voice telephony, mobile and broadband communications, cable and satellite television. On the other hand, the content of services delivered over electronic communications networks, such as broadcasting content or financial services, is excluded and so is telecommunications terminal equipment.

- "Directive 2002/19/EC of the European Parliament and of the Council, of 7 March 2002, on access to and interconnection of electronic communications networks and associated facilities (Access Directive)". This Directive establishes rights and obligations for operators and for undertakings seeking interconnection and/or access to their networks. The objective is to establish a framework to encourage competition by stimulating the development of communications services and networks, and also to ensure that any bottlenecks in the market do not constrain the emergence of innovative services that could benefit the users. The approach adopted is technologically neutral, i.e. the Directive does not intend to introduce rules to affect technological progress but, instead, to establish a modus operandi to address market issues. The Directive applies to all forms of communication networks carrying publicly available communications services. These include fixed and mobile telecommunications networks, networks used for terrestrial broadcasting, cable TV networks and satellite, as well as Internet networks used for voice, fax, data and image transmission.
- "Directive 2002/20/EC of the European Parliament and of the Council, of 7 March 2002, on the authorisation of electronic communications networks and services (Authorisation Directive)". The provisions of this Directive cover authorisations for all electronic communications networks and services, whether they are provided to the public or not. However, they only apply to the granting of rights to use radio frequencies where such use involves the provision of an electronic communications network or service, normally for remuneration. The aim is to establish a harmonised market for electronic communications networks and services by limiting regulation to the minimum that is strictly necessary.
- "Directive 2002/22/EC of the European Parliament and of the Council, of 7 March 2002, on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive)". The Directive intends to ensure the availability of a minimum set of high quality services that are available to all users at an affordable price, without distortion of competition. It lays down obligations with regard to the provision of certain mandatory

services, such as the retail provision of leased lines. It also establishes end-users' rights and the corresponding obligations of undertakings that provide publicly available electronic communications networks and services.

- "Directive 2002/58/EC of the European Parliament and of the Council, of 12 July 2002, on the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications)". The directive tackles a number of issues of varying degrees of sensitivity, such as the retention of connection data by the MSs for police surveillance purposes (data retention), the sending of unsolicited electronic messages, the use of cookies, and the inclusion of personal data in public directories. In March 2006, it was amended by "Directive 2006/24/EC of the European Parliament and of the Council, of 15 March 2006, on the retention of data generated or processed in connection with the provision of publicly available electronic communications services or of public communications networks". The aim of the latest Directive is to harmonise the provisions of the MSs concerning obligations incumbent on the providers of electronic communications services with respect to data retention.
- "Directive 2009/140/EC of the European Parliament and of the Council, of 25 November 2009 (Better Regulation Directive)". The directive amends the directives 2002/21/EC (Framework Directive), 2002/19/EC (Access Directive) and 2002/20/EC (Authorisation Directive) of the 2002 regulatory framework.
- "Directive 2009/136/EC of the European Parliament and of the Council, of 25 November 2009 (Citizens' Rights Directive)". The directive amends the directives 2002/22/EC (Universal Service Directive) and 2002/58/EC (Directive on privacy and electronic communications) of the 2002 framework, as well as Regulation (EC) No 2006/2004 on cooperation between national authorities responsible for the enforcement of consumer protection laws.
- "Regulation (EC) No 1211/2009 of the European Parliament and of the Council, of 25 November 2009". The regulation established the new Body of European Regulators for Electronic Communications (BEREC) and the Office. The new body will help ensure fair competition and more consistency of regulation on the telecoms markets. The aim is that BEREC replaces the present loose cooperation among national regulators in the form of the 'European Regulators Group' with a better structured and more efficient approach. BEREC decisions will be made, as a rule, by majority of heads of the 27 national telecoms regulators.

4. eSignatures:

- "Directive 1999/93/EC of the European Parliament and of the Council, of 13 December 1999, on a Community framework for electronic signatures". This Directive establishes the legal framework at European level for electronic signatures and certification services. The aim is to make electronic signatures easier to use and to help them become legally recognised within the MSs.

5. eProcurement:
   - The Directives "Directive 2004/17/EC of the European Parliament and of the Council, of 31 March 2004, on the coordination of the procurement procedures of entities operating in the water, energy, transport and postal services sectors" and "Directive 2004/18/EC of the European Parliament and of the Council, of 31 March 2004, on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts" aim to simplify, clarify, and revise previous legislation in this area by introducing two new legal instruments. They also provide a coherent framework for conducting procurement electronically in an open, transparent and non-discriminatory way, establish rules for tendering electronically and fix the conditions for modern purchasing techniques based on electronic means of communication.
6. Re-use of Public Sector Information:
   - "Directive 2003/98/EC of the European Parliament and of the Council, of 17 November 2003, on the reuse of public sector information". The term Public Sector Information refers to documents, databases, and other information produced, collected, and stored by public sector bodies. The Directive sets out a framework for the conditions of its reuse and aims to ensure equal treatment for commercial editors within the internal market. Public sector organisations authorizing this type of reuse continue to hold copyright and related rights. They are, however, invited to exercise their copyrights in a way that facilitates re-use.

# 2. CONCEPT OF INTEROPERABILITY

## 2.1. DEFINITIONS

Interoperability is a term which is commonly used in engineering of different technical systems, especially in computer science. The definition from this point of view characterizes interoperability as

> *"the capability to communicate, execute programs, or transfer data among various functional units in a manner that requires the user to have little or no knowledge of the unique characteristics of those units."* [13]

The Institute of Electrical and Electronics Engineers [14] provides a broader definition without specifying the nature of systems and components exchanging and using information:

> *"Interoperability is the ability of two or more systems or components to exchange information and to use the information that has been exchanged."*

In [15], one more concept is introduced in the definition of interoperability – "process":

> *"Interoperability is the ability of a system or process to use information and/or functionality of another system or process by adhering to common standards."*

The definition provided in [16] supplements the previous ones by specifying the nature of a process and a system:

> *"Interoperability means the ability of information and communication technology (ICT) systems and of the business processes they support to exchange data and to enable information and knowledge to be shared."*

According to [17], interoperability can be considered at different levels:

> *"Interoperability is the ability of systems and machines to exchange, process and correctly interpret information. It is more than just a technical challenge, as it also involves legal, organizational and semantic aspects of handling data."*

The definitions considered allow inferring of main characteristics of interoperability in general:

- it is the ability of ICT systems and business processes they support;

- the ability is related to exchange, processing, correct interpretation, use, and sharing of information;
- it involves technical, legal, organizational, and semantic aspects of handling data;
- manipulations with information adhere common standards.

The MODINIS programme [18] defines interoperability in the context of eGovernment and specifies that ICT systems and business processes belong to public authorities, as well as points out a reason for exchanging of information:

> *"Interoperability is the ability of public authorities' information communication technology (ICT) systems and business processes to share information and knowledge within and across organisational boundaries in order to better support the provision of public services as well as to strengthen support to public policies and to democratic processes."*

However, the definition accepted by the EC is provided in the European Interoperability Framework (EIF) [19]:

> *"Interoperability, within the context of European public service delivery, is the ability of disparate and diverse organisations to interact towards mutually beneficial and agreed common goals, involving the sharing of information and knowledge between the organisations, through the business processes they support, by means of the exchange of data between their respective ICT systems."*

In its turn, [9] points out that

> *"interoperability is the means by which this inter-linking of systems, information and ways of working will occur: within or between administrations, nationally or across Europe, or with the enterprise sector."*

Therefore, interoperability in the context of eGovernment is characterized in the following way:

- it is the ability of disparate and diverse organizations to interact;
- the interaction is needed for achievement of mutually beneficial and agreed common goals;
- the interaction involves sharing of information and knowledge between the organizations;

- the sharing occurs through the business processes of the organizations;
- the sharing occurs by means of the exchange, process, and correct interpretation of data between ICT systems used in the organizations;
- the interaction can happen between organizations of different levels: national, European, sectoral, etc.

Typically, two types of interoperability are considered:

- cross-border or interoperability between different national or organizational boundaries;
- cross-sectoral or interoperability between different sectors of economy.

Two other concepts – European public service and PA - must be understood in the context of interoperability.

In [16], Pan-European eGovernment services were defined as

> *"cross-border public sector information and interactive services, either sectoral or horizontal, i.e. of cross-sectoral nature, provided by European public administrations to European public administrations, businesses, including their associations, and citizens, including their associations, by means of interoperable trans-European telematic networks."*

where a telematic network, in its turn, is

> *"a comprehensive data-communication system, comprising the physical infrastructure and connections as well as the related services and application layers, thus enabling the interchange of information electronically between and within public administrations as well as between public administrations and businesses and citizens."*

After six years, a more laconic definition was provided. It defines a European public service as

> *"a cross-border public sector service supplied by public administrations, either to one another or to European businesses and citizens by means of cooperation between those administrations."* [1, 20]

Additionally, in [3] services are divided into two categories: basic services which are the most fundamental service components and complex services built from basic services.

Summarizing the definitions provided so far, several characteristics of a public service can be extracted. Therefore:

- a public service is a cross-border public sector service;
- it is supplied by PAs;
- the supply occurs :
  - between and within different PAs;
  - from PA to European businesses;
  - from PA to European citizens;
- the supply is possible by means of cooperation of PAs and usage of comprehensive data-communication system enabling interchange of information electronically;
- a public service can be viewed as a basic or complex service.

According to [21], PA has many definitions: some authors consider that PA is centrally concerned with the organization of government policies and programmes as well as the behaviour of officials (usually non-elected) formally responsible for their conduct, other specialists in the field define PA as all processes, organizations and individuals (the latter acting in official positions and roles) associated with carrying out laws and other rules adopted or issued by legislatures, executives and courts, as well as some parties assert that PA is the use of managerial, political and legal theories and processes to fulfil legislative, executive and judicial mandates for the provision of government regulatory and service functions.

According to the United Nations Development Programme, PA has two closely related meanings [21, 22]:

> *"• the aggregate machinery (policies, rules, procedures, systems, organizational structures, personnel and so forth) funded by the State budget and in charge of the management and direction of the affairs of the executive government, and its interaction with other stakeholders in the State, society and external environment;*

- *the management and implementation of the whole set of government activities dealing with the implementation of laws, regulations, and decisions of the Government and the management related to the provision of public services."*

According to [19],

*"public administration refers to either national public administrations (at any level) or bodies acting on their behalf, and/or EU public administrations."*

In [23], the broader explanation is provided:

*"1. "public sector body" means the State, regional or local authorities, bodies governed by public law and associations formed by one or several such authorities or one or several such bodies governed by public law;*

*2. "body governed by public law" means any body:*

*a) established for the specific purpose of meeting needs in the general interest, not having an industrial or commercial character; and*

*b) having legal personality; and*

*c) financed, for the most part by the State, or regional or local authorities, or other bodies governed by public law; or subject to management supervision by those bodies; or having an administrative, managerial or supervisory board,*

*d) more than half of whose members are appointed by the State, regional or local authorities or by other bodies governed by public law."*

## 2.2. E-BARRIERS

Topicality of interoperability issues is closely related to reduction of electronic barriers (e-barriers). As it is known, the EU promotes the European single (internal) market [24]. Citizens and businesses use freedoms offered by this single market. As a result, they usually need some documents/information for work, study, mobility, etc. not only in their country, but also abroad. For this purpose, they contact an institution of PA.

However, in Europe, the provision of public services is still often rather fragmented and people have to go from one "counter" to another (whether physical or on the web) [9]. Therefore, citizens and

businesses must know departments involved in provision of services and the whole process of receiving a specific service. In this light, companies and citizens would much benefit from borderless online environment [25] for receiving the necessary services, but the set of e-barriers create

obstacles for creation of such an environment. This situation is displayed in Figure 2.1.

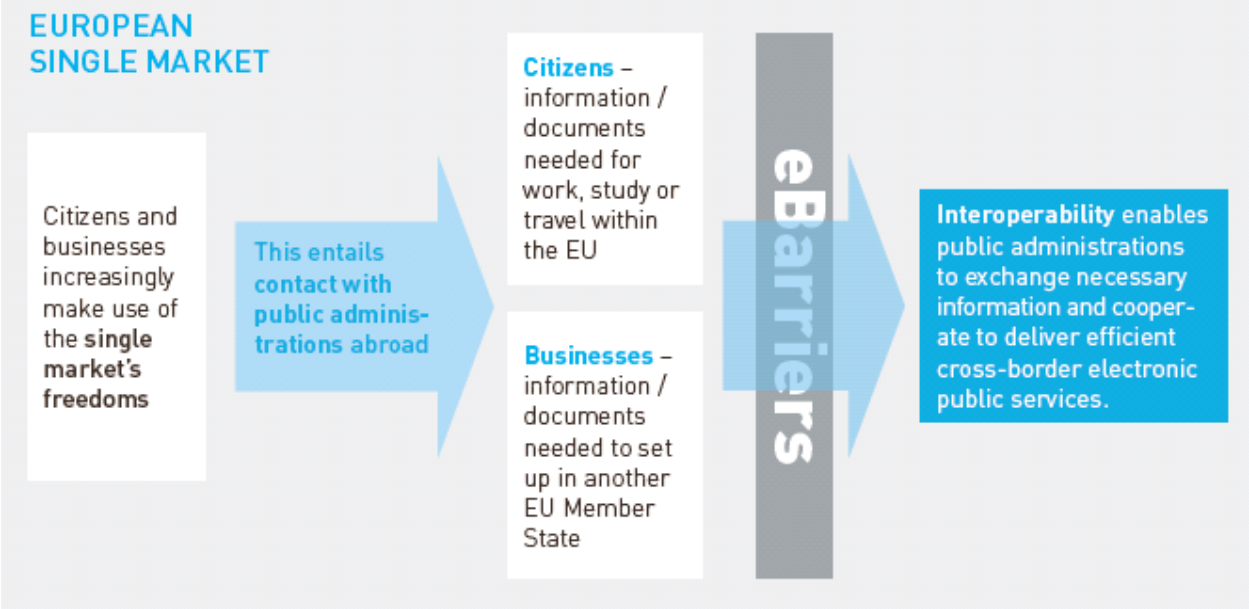



Figure 2.1. E-barriers and interoperability (adopted from [26])

Seven most significant e-barriers were identified by the EC [27]:

1. fragmented digital markets due to different and incompatible ICT solutions used in different countries and institutions;
2. lack of investment in networks;
3. lack of interoperability due to weaknesses in standard-setting, public procurement, and coordination between public authorities;
4. lack of digital literacy and skills excluding many citizens from the digital society and economy;
5. fragmented answers to acute societal challenges such as climate change, an ageing population, rising health costs, developing more efficient public services, integrating people with disabilities, digitising Europe's cultural heritage, etc.;
6. insufficient research and development;

7. rising cybercrime and low trust due to multiplication of databases and new technologies, rising identity theft and cyber-attacks.

The mentioned e-barriers are shown in the inner ring of Figure 2.2.

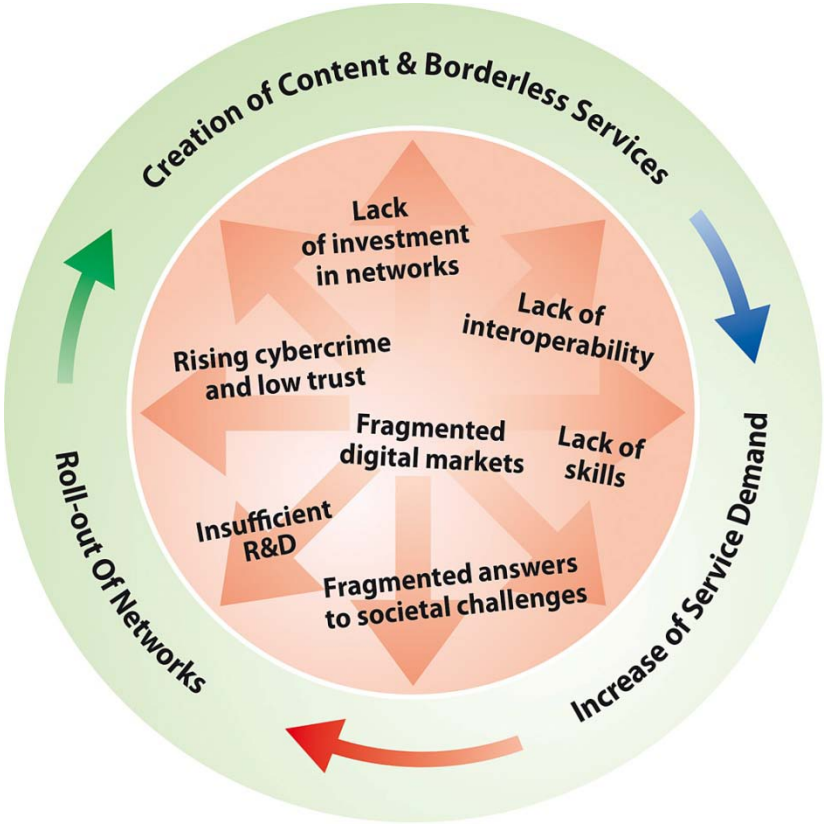



Figure 2.2. Virtuous cycle of the digital economy (adopted from [27])

As a result, e-barriers fragment the internal market and hinder it and associated freedoms of movement from functioning properly [3] having negative effects on openness and competitiveness of EU markets and the mobility across borders as well as have impact on the delivery of some services of general interests to citizens and enterprises, whether economic or non-economic [28, 29]. According to [25], Europe needs to tackle these challenges to create a virtuous cycle in which ICT stimulates the EU economy (Figure 2.2).

In general, new e-barriers can emerge from:

1. situation before transformation of PAs due to current legal, cultural, linguistic, and administrative differences of countries constituting the EU;

2. situation after transformation of PAs. It is related to dynamically changing legislation, needs of businesses and citizens, organizations of PA, and business processes and technologies [198]. In [28], high risk of emergence of e-barriers is associated with this transformation due to its national dimension and due to lack of interoperability at European level so that citizens and enterprises are not able to interact electronically with a national administration other than their own with the same ease as local citizens and enterprises. One more reason - the rapid development of ICT and possibility that the MSs opt for different or incompatible solutions – is provided in [29].

As it is pointed out in [20], transformation and modernization of public services in Europe should be achieved by avoiding creating barriers to the internal market. This is possible by providing interoperability of cross-border European public services at European level, promoting commonly agreed information technology (IT) solutions, and ensuring appropriate governance [2, 20, 26, 29].

> *"Without a comprehensive approach to interoperability, there is a risk that Member States might opt for mutually incompatible solutions that, rather than boosting efficiency and savings, will only build new barriers to the delivery of European Public Services in the internal market and increase the costs and administrative burden."* [30]

According to [9], economic and social costs are results of failure to put in place interoperable eGovernment systems. They include:

- static unresponsive PAs that are expensive to run and incapable of implementing policy promptly;
- inability to develop value added eGovernment services;
- higher costs, greater administrative burden, and competitive disadvantage relative to local firms (e.g. inability to participate in public e-procurement activities);
- hampering the proper functioning of the internal market.

### 2.3. INTERACTION SCENARIOS

Figure 2.3 displays the main parties involved in provision and usage of public services. EU administration is the main regulator and facilitator of initiatives related to development of public services and making

them interoperable. PAs of the EU countries are the prime partners in development of public services. Citizens and businesses of the EU countries are the main recipients of services developed.

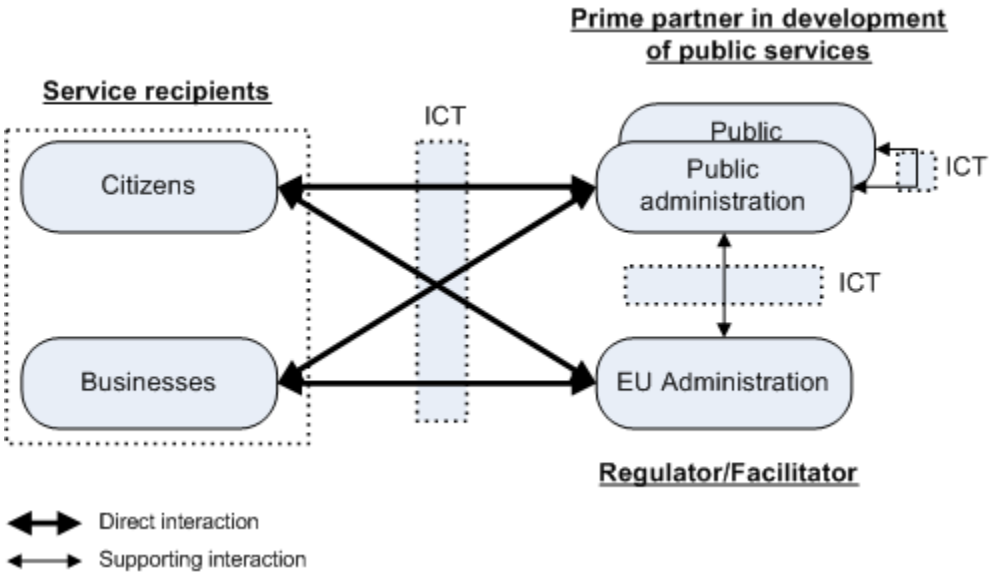



Figure 2.3. Parties involved in development and usage of public services

According to [19], interoperability comes into play in a number of interaction scenarios. These scenarios can be subdivided in 3 main interaction types with corresponding sub-types:

- Administration-to-Administration:
  - PA in one MS – PA in another MS;
  - PA in a MS – EU administration;
- Administration-to-Business:
  - PA in one MS – business in another MS;
  - EU administration – business in some MS;
- Administration-to-Citizen:
  - PA in one MS – citizen in another MS;
  - EU administration – citizen in some MS.

The mentioned interaction types are displayed in Figure 2.4.

Scenario 1: Public administration in one Member state – Business/citizen in another Member state

This interaction scenario is displayed in Figure 2.5. It comprises those government e-services that are provided to citizens or businesses at a national level, but that may also be of interest to citizens or enterprises located in other countries [31].

One of the examples of such interaction is

> *"when a citizen from Member State Y taking up a job in destination Member State X has to complete a number of formalities in Member State X"* [19].

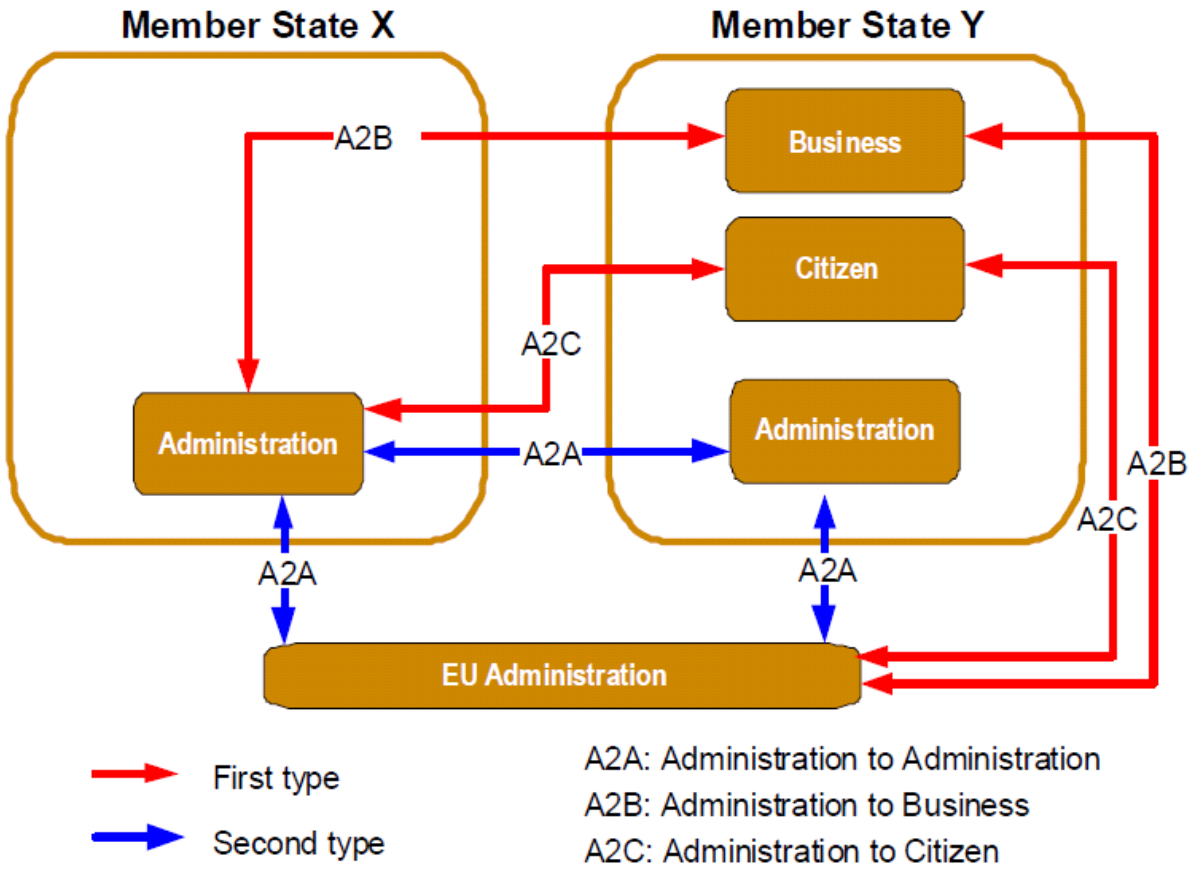



Figure 2.4. European public service scenarios (adopted from [19])

The other example given in [31]:

> *"a web-based job search service provided by a labour agency based in a European region can be accessed to find job vacancies and to submit CV summary. The supporting system features a "push" service to alert an applicant via e-mail when opportunities arise for that applicant, based on the experience record as specified in*

*the CV summary. Designed to serve a national community, this service is in fact of interest to the wider EU community, i.e. to any enterprise or any individual, wishing to settle in that region."*

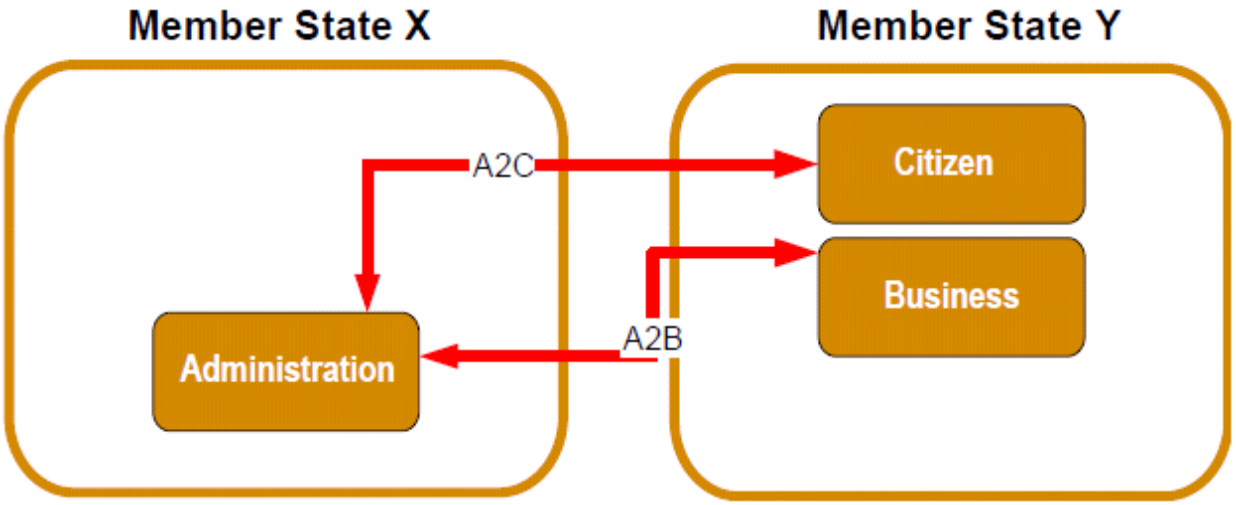



Figure 2.5. Interaction between PA in one MS and business/citizen in another MS (adopted from [19])

Scenario 2: Public administration in one Member state – Public administration in another Member state

This type of interaction is displayed in Figure 2.6. According to [31], it involves processes in which multiple administrations play a role. In a typical example, a citizen or an enterprise accesses a government e-service to receive information, to submit information (e.g. an application), or to perform a fully-fledged administrative transaction that triggers a complex process involving multiple authorities. At a pan-European level, this interaction type involves interoperability and the exchange of information between administrations in different MSs.

One of the examples is:

*"a service provider established in Member State X wishing to establish in Member State Y submits a request for establishment in Member State Y. To process his request and avoid asking the required information to the service provider, administrative bodies in both Member State X and Y could exchange information directly." [19]*

The other example:

*"An employee with a long record of working abroad (in different Member States) is retiring and needs to apply for a pension. To do so, the employee uses a web service provided by the local social security agency. In order to address the request submitted by the employee, the local social security agency needs to connect with all agencies (in each of the countries in which the employee has paid pension funds) to collect the data needed for the calculation of the employee's pension scheme."* [31]

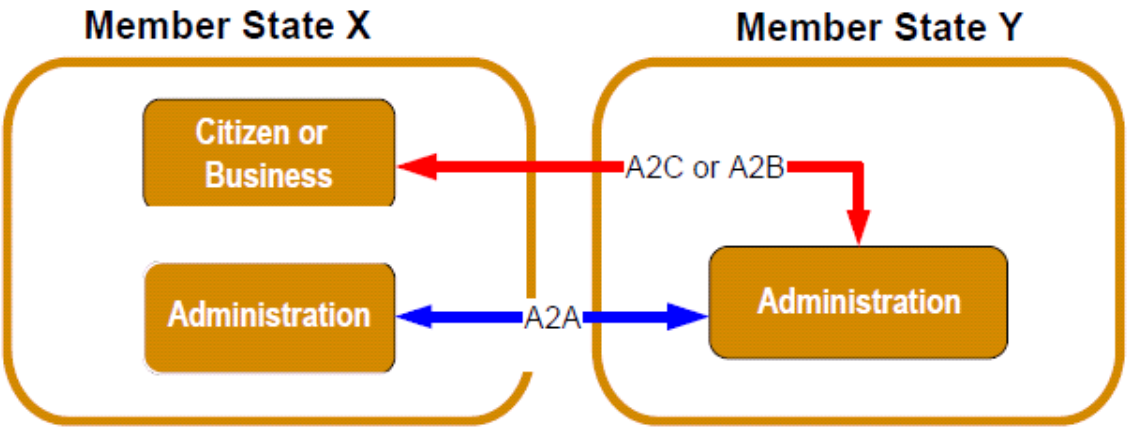



Figure 2.6. Interaction between PA in one MS and PA in another MS (adopted from [19])

Scenario 3: Public administration in a Member state – EU administration

This type of interaction is shown in Figure 2.7. It involves networks of administrations in a given sector where EU law requires MS administrations to collect, exchange, and share information with each other, and/or with EU institutions and agencies [19].

Examples of such interaction include cases where MSs provide information and statistics to a competent European authority, which then disseminates the aggregated information to the public concerned [19]. For example:

*"National statistical agencies in each of the Member States must submit statistical data to Eurostat on a regular basis. Eurostat processes the data and then makes them available to its customers, which include a large number of Member States Administrations."* [31]

## 2.4. EXAMPLES OF SERVICES

Table 2.1 illustrates examples of services and their correspondence to the previously described interaction types.

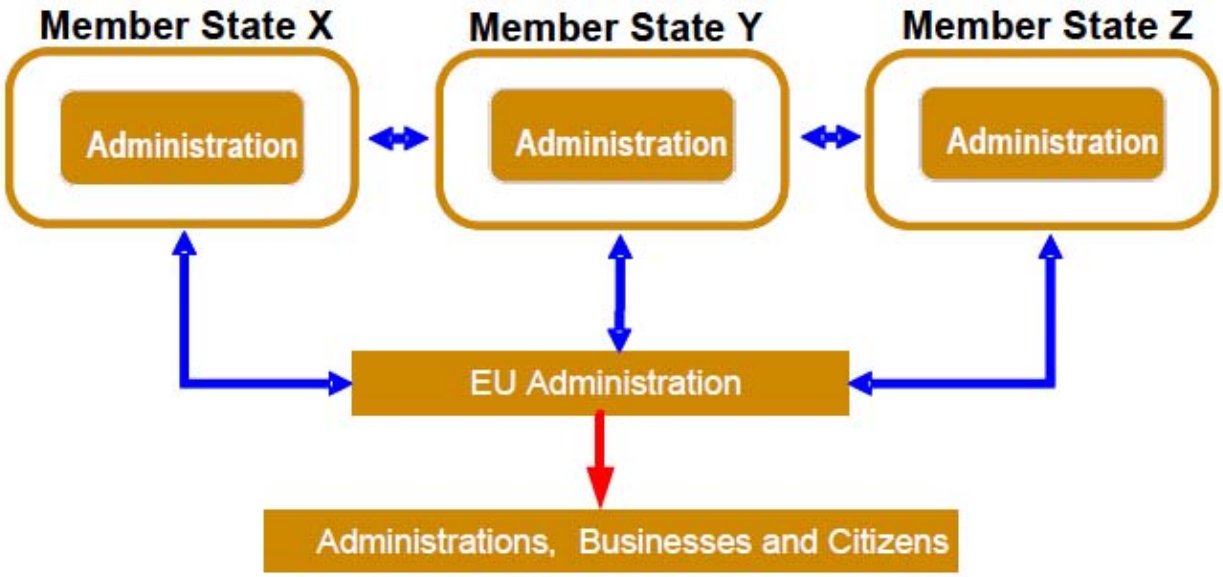



Figure 2.7. Interaction between PA in several MSs and EU administration (adopted from [19])

## 2.5. BENEFITS AND BENEFICIARIES OF INTEROPERABILITY

According to [19],

> *"interoperability is both a prerequisite for and a facilitator of efficient delivery of European public services."*

Figure 2.8 illustrates the impact of achieved interoperability.

In the framework of the MODINIS programme (see Section 6.4), the following five different settings in which the advantages of interoperable ICT systems are evident were identified [18]:

- between different services referring to the same customer, namely bundling services (e.g. according to life events or problem scenarios) to save resources or to improve service quality (one-stop government);
- between different stages of a supply chain that is producing one or more services, namely when a single service cannot be produced completely by one single agency, there is a need for

interoperability between data and workflow contributions from other agencies/back offices;

- between single agencies in different geographical areas, namely interoperability referring to the direct data transfer from the system of one administration to the system of another administration (mainly geographical);

Table 2.1

Examples of services (adopted from [19])

| Sector/Area | Interaction type | Service |
|---|---|---|
| Business development | Administration-to-Business<br>Administration-to-Administration | Start-up of a company |
| | | Public procurement |
| | | Registration of patents, trademarks, designs |
| | | Consumer protection, labelling, packaging |
| Certificates and licenses | Administration-to-Citizen | Birth and marriage certificates |
| | | Driving licences |
| | | Passports, visas |
| | | Residence and working permits |
| | | Car registration |
| Education | Administration-to-Citizen | Enrolment in schools and universities |
| | | Study grants |
| Taxes for citizens | Administration-to-Citizen | Online Tax |
| Social security | Administration-to-Citizen | Information service for social security systems |
| | | Unemployment benefits |
| | | Child allowances |
| | | Pensions |
| | | Public health insurance |
| Supply of statistical data | Administration-to-Business<br>Administration-to-Administration | Tax for businesses |
| | | VAT refunding |
| | | Information on tax incentives |
| | | Declaration of excise goods |
| Work | Administration-to-Citizen | Recognition of qualifications and diplomas |
| | | Job search |
| Customs | Administration-to-Citizen<br>Administration-to-Business<br>Administration-to-Administration | Information on Customs duties |
| | | Customs declarations |

- between directories of services or documents, namely interoperability between local directories, common metadata about the services as well as algorithms for locating the right agency. One crucial issue concerns common descriptors for services and agencies;
- in auxiliary services (identity management, digital signature, etc.).

Table 2.2, in its turn, summarizes the main beneficiaries of interoperability and advantages they receive from interoperable public services.

## 2.6. INTEROPERABILITY INITIATIVES

In general, interoperability at EU level is promoted through several initiatives. All together they form the interoperability governance pyramid where each initiative complements the other one (Figure 2.9). Taking into account the current status of initiative efforts, the previous figure can be transformed in Figure 2.10. Therefore, the EIS (see Section 5.1) accepted in 2010 focuses on the governance activities for interoperability towards European public services, the EIF (see Section 5.2) accepted in the same year looks at the conception of European public services, the European Interoperability Architecture (EIA) study (see Section 5.4) investigates the implementation of European public services, and the European Interoperable Infrastructure Services (EIIS) (see Section 5.4) support the operation of European public services [34].

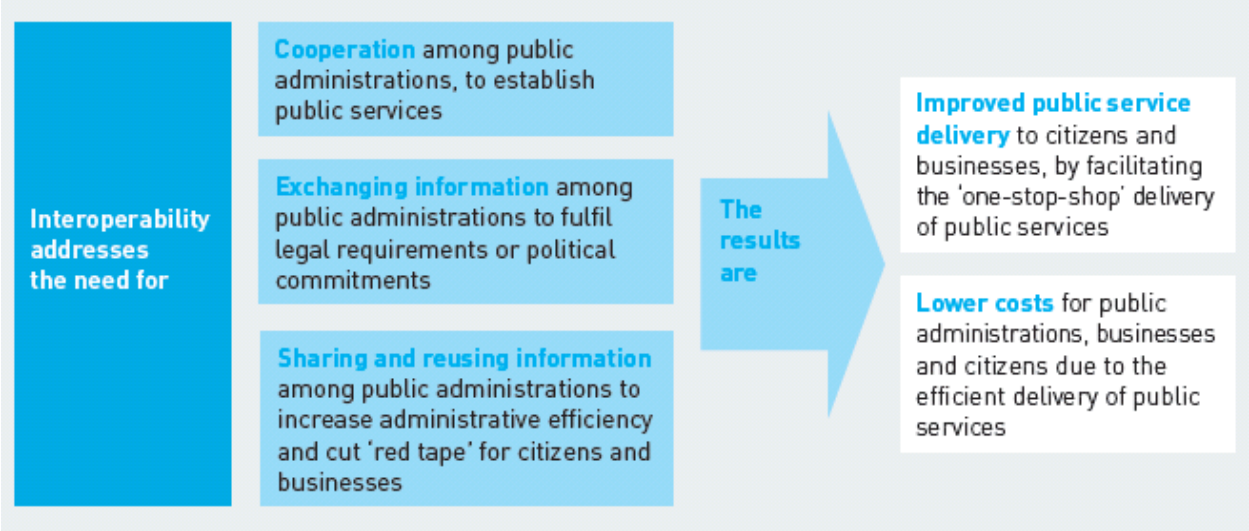



Figure 2.8. The impact of achieving interoperability (adopted from [26])

Table 2.2

Beneficiaries of interoperability

| Beneficiary | Advantage |
|---|---|
| MSs' PAs and EC services | • gain in efficiency when establishing European public services [2];<br>• greater awareness of the risk of creating new e-barriers if they opt for public services solutions that are not interoperable at EU level [2];<br>• cooperation which facilitates the exchange, sharing, and reuse of information [3]. |
| Citizens and businesses | • efficient and effective delivery of public services to citizens and enterprises across borders and sectors [29];<br>• reducing costs [3];<br>• preventing duplication of efforts [3];<br>• reducing the administrative burden [28]. |
| EU as a whole | • contribution to the achievement of the Lisbon goal [5] of making Europe the most dynamic and competitive, knowledge-based economy by improving citizens' quality of life, by supporting the single market in areas such as citizen mobility and by reducing administrative burden on enterprises[32];<br>• more efficient implementation of EU policies and initiatives [20, 33];<br>• fostering the enhancement of the common market via the four freedoms and, in particular, mobility in Europe [20];<br>• support of the economic integration of the countries and the consolidation of the internal market [20]. |

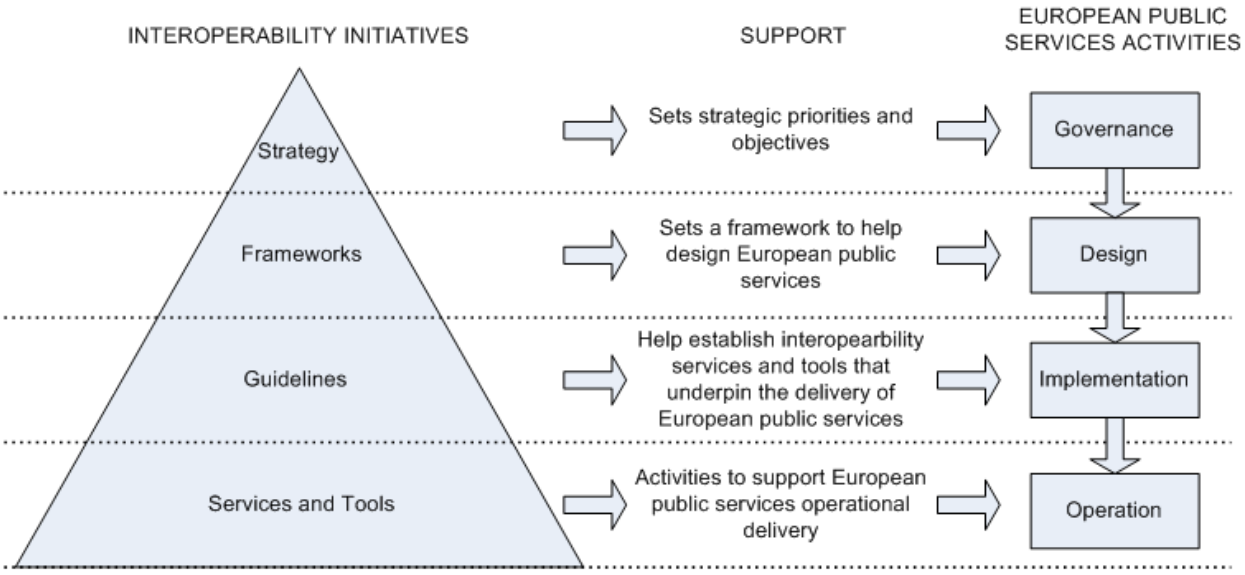



Figure 2.9. The interoperability governance pyramid (adopted from [26])

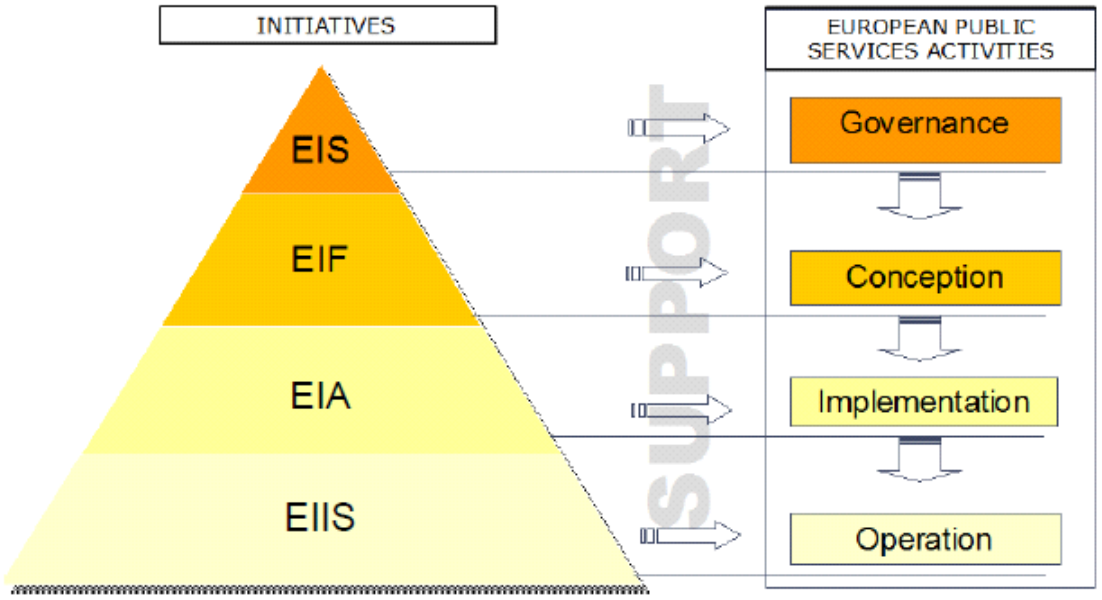



Figure 2.10. The status of the initiatives of the interoperability governance pyramid (adopted from [34])

## 3. THE CURRENT POLITICAL CONTEXT

Interoperability issues and aspects have to be seen in the overall context of other current EU initiatives:

- The Europe 2020 strategy;
- The Digital Agenda for Europe;
- The European eGovernment Action Plan 2011-2015.

The Europe 2020 strategy for smart, sustainable, and inclusive growth addresses 7 flagship initiatives to boost growth and jobs in Europe. One of these initiatives is related to smart growth which means improving EU's performance in education, research/innovation, and digital society [35]. Digital society calls for the Digital Agenda for Europe concerned with delivery of sustainable economic and social benefits from the creation of a single digital market based on fast/ultrafast Internet and interoperable applications [27].

The Digital Agenda, in its turn, outlines 8 pillars with 100 follow-up actions, of which 31 would be legislative [27]. The most part of the actions must be put into place up to 2015. Table 3.1 specifies the main pillars and actions which are relevant in the context of interoperability.

The Digital Agenda defines the following key performance targets related to public services [27]:

> *"• eGovernment by 2015: 50% of citizens using eGovernment, with more than half of them returning filled in forms. Baseline: In 2009, 38% of individuals aged 16-74 had used eGovernment services in the last 12 months, and 47% of them used eGovernment services for sending filled forms.*
> - *cross-border public services: by 2015 online availability of all the key cross-border public services contained in the list to be agreed by Member States by 2011. No baseline."*

Table 3.1

Pillars and actions of the Digital Agenda relevant to the context of interoperability [27, 36]

| Pillar | Action | Problem considered | Specific action and planned date | Activities of the EC | Reference |
|---|---|---|---|---|---|
| Digital Single Market | Action 8: Revision of the eSignature Directive | Necessity of secure solutions to protect personal data online | 2011: propose a revision of the eSignature Directive with a view to provide a legal framework for cross-border recognition and interoperability of secure eAuthentication systems | In 2010:<br>• set up a formal expert group to assist the EC in drafting the revised directive;<br>• consult MSs and industry on issues related to eID and prepare a Commission Communication on eID, authentication and signature policy.<br>In 2011:<br>• consult stakeholders further and prepare an impact assessment for the revised Directive;<br>• give permission to European Standardisation Organisations to develop eID standards that could be used across the EU;<br>• adopt the Communication on a proposal for a revised Directive.<br>In 2012:<br>• adopt the Directive on eID and standardisation. | eSignature Directive - Directive 1999/93/EC on a Community framework for electronic signatures, 13.12.1999 |

Table 3.1 (continued)

Pillars and actions of the Digital Agenda relevant to the context of interoperability [27, 36]

| Pillar | Action | Problem considered | Specific action and planned date | Activities of the EC | Reference |
|---|---|---|---|---|---|
| Interoperability and Standards | Action 21: Propose legislation on ICT interoperability | Hampering growth in Europe's ICT sector due to the fragmentation of the potential market for EU-produced technologies and services | 2010: Make proposals to reform of rules on implementation of ICT standards in Europe to allow using of certain ICT fora and consortia standards | • provide ICT expertise where necessary to support the implementation of the legislative package;<br>• chair the "European Multi-Stakeholder Platform on ICT Standardisation" which has the role to advise the EC on matters relating to the implementation of standardisation policy in the ICT field;<br>• identify and execute appropriate standardization actions in the context of the Framework Programme for Research and Innovation, as well as in regulatory actions and in public policies. | |
| | Action 24: Adopt a European Interoperability Strategy and Framework | Prevention of digital services and devices working across borders due to weaknesses in standard-setting, public procurement and coordination between European public authorities | Promote interoperability by adopting in 2010 a EIS and EIF | • adopt an ambitious EIS and the EIF | EIS (see Section 5.1)<br>EIF (see Section 5.2) |

Table 3.1 (continued)

Pillars and actions of the Digital Agenda relevant to the context of interoperability [27, 36]

| Pillar | Action | Problem considered | Specific action and planned date | Activities of the EC | Reference |
|---|---|---|---|---|---|
| Interoperability and Standards | Action 26: MSs to implement EIF | No internal virtual market due to interoperability problems | MSs should apply the EIF at national level by 2013 | In 2011 :<br>• deploy the results of the first CIP ICT PSP Large Scale Pilots;<br>• launch a study on the needs and costs benefit of cross-border services and the existing barrier.<br>In 2012:<br>• explore the results of the study will launch new Large Scale Pilot within the CIP ICT PSP with the aim of developing and demonstrating EU-wide interoperability between national systems in the public sector. | EIF (see Section 5.2)<br>CIP ICT PSP Large Scale Pilots (see Section 6.3 and 7) |
| | Action 27: MSs to implement Malmö and Granada declarations | Absence of common standards | MSs should implement commitments on interoperability and standards in the Malmö and Granada Declarations by 2013.<br>This action is the "umbrella" action for the Interoperability and Standards Pillar of the Digital Agenda. | By the end of 2011:<br>• establish a framework to provide guidance on the selection of standards and specifications to the MSs.<br>In 2012:<br>• launch a new Large Scale Pilot within the CIP ICT PSP with the aim of developing and demonstrating EU-wide interoperability between national systems in the public sector. | Malmö declaration (see Section 4)<br>Granada declaration (see Section 4)<br>CIP ICT PSP (see Section 6.3) |

Table 3.1 (continued)

Pillars and actions of the Digital Agenda relevant to the context of interoperability [27, 36]

| Pillar | Action | Problem considered | Specific action and planned date | Activities of the EC | Reference |
|---|---|---|---|---|---|
| ICT for Social Challenges | Action 76: Propose a recommendation to define a minimum common set of patient data | Lack of interoperability undermine patients' safety | Propose a recommendation defining a minimum common set of patient data for interoperability of patient records to be accessed or exchanged electronically across MSs by 2012 | By the end of 2010:<br>• consult with MSs and relevant stakeholders;<br>• negotiate with epSOS the extension of the project to include additional MSs and European Countries.<br>In 2011:<br>• assess in cooperation with stakeholders the results of the first piloting phase of epSOS and of the thematic network CALLIOPE;<br>• follow the legislative process of the proposal for a Directive on the application of patients' rights in cross-border healthcare and ensure implementation;<br>• monitor the evaluation and revision of the Directive on the protection of personal data;<br>• adopt a New eHealth Action plan 2012-2020 in which the issue will be addressed.<br>In 2012:<br>• adoption of the EC Recommendation and of a mechanism for monitoring its implementation. | epSOS (see Section 7.2)<br><br>CALLIOPE – http://www.calliope-network.eu |

Table 3.1 (continued)

Pillars and actions of the Digital Agenda relevant to the context of interoperability [27, 36]

| Pillar | Action | Problem considered | Specific action and planned date | Activities of the EC | Reference |
|---|---|---|---|---|---|
| ICT for Social Challenges | Action 77: Foster EU-wide standards, interoperability testing and certification of eHealth | Fragmentation of the eHealth market in the EU due to the different national, regional, and local interoperability frameworks and lack of EU-wide standards | Foster EU-wide standards, interoperability testing and certification of eHealth systems by 2015 through stakeholder dialogue | By the end of 2010:<br>• sign a Memorandum of Understanding (MoU) with the US on eHealth Interoperability;<br>• ensure impact of interoperability and standards-related Support Actions (under FP7) and leverage results from epSOS.<br><br>In 2011:<br>• launch and guide the Network of Excellence in the area of Semantic Interoperability;<br>• propose to the eHealth Governance Initiative to prioritize use cases and develop eHealth profiles;<br>• seek to launch a sustainable initiative involving relevant stakeholders to develop eHealth profiles in order to address use cases prioritized by the eHealth Governance initiative. | epSOS (see Section 7.2) |

Table 3.1 (continued)

Pillars and actions of the Digital Agenda relevant to the context of interoperability [27, 36]

| Pillar | Action | Problem considered | Specific action and planned date | Activities of the EC | Reference |
|---|---|---|---|---|---|
| ICT for Social Challenges | | | | In 2012:<br>• demonstrate eHealth interoperability testing and certification on a large scale;<br>• develop a European eHealth Interoperability Framework;<br>• follow up on the implementation of EU-US MoU on eHealth Interoperability. | |
| | Action 83: Propose a Council and Parliament Decision on mutual recognition of eID | Lack of an European approach in the digitalisation of the PA | Propose by 2012 a Council and Parliament Decision to ensure mutual recognition of e-identification and e-authentication across the EU based on online 'authentication services' to be offered in all MSs (which may use the most appropriate official citizen documents – issued by the public or the private sector) | By the end of 2010:<br>• adoption of the eGovernment Action Plan 2011-2015, calling specifically on eID actions.<br>In 2011:<br>• public online consultation on e-identification, authentication and signatures;<br>• analysis of the contributions to the public online consultation;<br>• socio-economic study on a new Pan-European electronic Identity Infrastructure; | SSEDIC - http://www.eid-ssedic.eu/<br>STORK (see Section 7.5) |

Table 3.1 (continued)

Pillars and actions of the Digital Agenda relevant to the context of interoperability [27, 36]

| Pillar | Action | Problem considered | Specific action and planned date | Activities of the EC | Reference |
|---|---|---|---|---|---|
| ICT for Social Challenges | | | | • feasibility study on an electronic identification, authentication and signature policy;<br>• start up of SSEDIC, an ICT PSP Thematic network on European Digital Identity;<br>• STORK project completed.<br>In 2012:<br>• proposal for a Council and Parliamentary Decision. | |
| | Action 84: Support seamless cross-border eGovernment services in the single market | Lack of seamless, interoperable and sustainable eGovernment cross-border services | The EC will support seamless cross-border eGovernment services in the single market through the Competitiveness and Innovation Programme (CIP) and Interoperability Solutions for European Public Administrations (ISA) Programme | By the end of 2010:<br>• adopt the eGovernment Action Plan 2011-2015, calling also on cross-border services;<br>• ongoing Large Scale Pilot projects like STORK, PEPPOL start their piloting phase and SPOCS is being extended to bring on board new MSs. In addition, a new Large Scale Pilot on eJustice will be launched.<br>In 2011:<br>• the EC will continue to support the experience sharing and good practice exchange between running and new Large Scale Pilots; | CIP ICT PSP Programme (see Section 6.3)<br>ISA Programme (see Section 6.2)<br>eGovernment Action Plan 2011-2015 (further in this section)<br>STORK (see Section 7.5)<br>PEPPOL (see Section 7.3)<br>SPOCS (see Section 7.4) |

Table 3.1 (continued)

Pillars and actions of the Digital Agenda relevant to the context of interoperability [27, 36]

| Pillar | Action | Problem considered | Specific action and planned date | Activities of the EC | Reference |
|---|---|---|---|---|---|
| ICT for Social Challenges | | | | • the EC will launch studies to assess critical sustainability issues of the STORK and PEPPOL;<br><br>• the EC will launch a study to analyse the existing and future needs and cost benefit of cross-border eGovernment services and assess the organisational, legal, technical and semantic barriers together with the MSs.<br><br>In 2012:<br>• the EC will facilitate the exchange of views with the MSs to identify which new cross-border services could be piloted under the CIP ICT PSP programme and which services could possibly be rolled out in 27 MSs. | |
| | Action 85: Review the public access to Environmental Information Directive | Not enough development or fragmentation along national borders of eEnvironment services, as a category of eGovernment services | To review by 2011 the public access to Environmental Information Directive | By the end of 2010:<br>• the EC will have analysed the national reports on application of the Directive sent by the MSs in accordance with the provisions of the Directive. | Environmental Information Directive - Directive 2003/4/EC on public access to environmental information, 28.01.2003 |

Table 3.1 (continued)

Pillars and actions of the Digital Agenda relevant to the context of interoperability [27, 36]

| Pillar | Action | Problem considered | Specific action and planned date | Activities of the EC | Reference |
|---|---|---|---|---|---|
| ICT for Social Challenges | | | | By the end of 2011:<br>• the EC will address a Communication on the application of the Directive on public access to environmental information to the European Parliament and to the Council.<br><br>In 2012:<br>• if the Communication proves necessary the EC will present proposals for amending the Directive. Otherwise, the EC will continue to gather information necessary for possible amendments in the future. | |
| | Action 86: Implement cross-border eEnvironment services | To take advantage of more efficient ICT solutions | Implement eEnvironment information services, including monitoring, notably through advanced sensor networks | By the end of 2011:<br>• a SEIS Implementation Plan will outline the priorities and improved co-ordination and planning of mutually supportive activities;<br><br>• the EC will adopt a Communication to the European Parliament and to the Council on the review of the Directive on the public access to environmental information. | SEIS - http://ec.europa.eu/environment/seis/ |

Table 3.1 (continued)

Pillars and actions of the Digital Agenda relevant to the context of interoperability [27, 36]

| Pillar | Action | Problem considered | Specific action and planned date | Activities of the EC | Reference |
|---|---|---|---|---|---|
| ICT for Social Challenges | | | | By the end of 2016:<br>• eGovernement 'eEnvironment' services will be available and inter-operable across administrative and jurisdictional boundaries and by 2020 the quality and availability of data will be sufficient to support EU policy objectives related to the environment achieved at pan-European level. | |
| | Action 87:<br>Issue White Paper on inter-connecting e-procurement capacity in EU | High technical barriers between MSs<br>to enable the private sector to access public tendering throughout the EU | Define by 2011 concrete steps in a White Paper on how to inter-connect e-procurement capacity across the single market | By the end of 2010:<br>• complete and publish evaluation of the (2004) e-Procurement Action Plan;<br>• publish EC Green Paper on challenges and options for Community action to facilitate the transition to e-Procurement;<br>• launch public consultation on issues/options presented in the Green Paper – including organisation of an open hearing. | e-Procurement Action Plan 2004 - Action plan for the implementation of the legal framework for electronic public procurement, 13.12.2004, Brussels |

Table 3.1 (continued)

Pillars and actions of the Digital Agenda relevant to the context of interoperability [27, 36]

| Pillar | Action | Problem considered | Specific action and planned date | Activities of the EC | Reference |
|---|---|---|---|---|---|
| ICT for Social Challenges | | | | By the end of 2011:<br>• publish a summary of feedback on Green Paper;<br>• analyse impact of some core actions to improve EU legislative and policy environment;<br>• finalise White Paper with concrete steps on how to inter-connect e-Procurement infrastructure. | |
| | Action 89: MSs to make eGovernment services fully interoperable | Risk of emergence of new electronic barriers when establishing national eGovernment services | MSs should make eGovernment services fully interoperable overcoming organisational, technical, or semantic barriers and supporting IPv6 | By the end of 2010:<br>• adopt the Communication on the EIF and EIS;<br>• launch a study under the ISA programme, exploring the need for a EIA, facilitating the establishment of cross-border and cross-sector European public services;<br>• set up the National Interoperability Frameworks Observatory (NIFO), to carry out a comparative analysis of National Interoperability Frameworks (NIFs), propose recommendations addressing potential incompatibility and raise awareness about the NIFs. | EIF (see Section 5.2)<br>EIS (see Section 5.1)<br>ISA programme (see Section 6.2)<br>NIFO (see Section 5.3)<br>NIFs (see Section 5.3) |

Table 3.1 (continued)

Pillars and actions of the Digital Agenda relevant to the context of interoperability [27, 36]

| Pillar | Action | Problem considered | Specific action and planned date | Activities of the EC | Reference |
|---|---|---|---|---|---|
| ICT for Social Challenges | | | | By the end of 2011:<br>• the EC will support the MSs in reaching commonly agreed targets by facilitating the exchange of experiences, including on sharing or re-using applications;<br>• launch an innovation pilot in order to support the deployment of IPv6 by public authorities through integration of IPv6 into eGovernment services. | |
| | Action 90: Points of Single Contacts (PSCs) should function as fully fledged eGovernment centres | Most online public services do not work across borders | MSs should ensure that the PSC function as fully fledged eGovernment centres beyond requirements and areas covered by the Services Directive | In 2011:<br>• the EC will carry out a study on the PSCs. It will test how user-friendly and how well the PSCs function, including the electronic completion of procedures. It will also identify the main problems and how these could be solved;<br>• MSs will continue working on their PSCs in cooperation with the EC, in particular on the cross-border aspects of electronic procedures. MSs will also disseminate and exploit knowledge and expertise produced by the project SPOCS. | Services Directive (Points of Single Contacts) (see Section 4)<br><br>SPOCS (see Section 7.4) |

Table 3.1 (continued)

Pillars and actions of the Digital Agenda relevant to the context of interoperability [27, 36]

| Pillar | Action | Problem considered | Specific action and planned date | Activities of the EC | Reference |
|---|---|---|---|---|---|
| ICT for Social Challenges | Action 91: MSs to agree a common list of key cross-border public services | Not enough cross-border public services are available | Agree by 2011 on a common list of key cross-border public services that correspond to well defined needs – enabling entrepreneurs to set up and run a business anywhere in Europe independently of their original location, and allowing citizens to study, work, reside and retire anywhere in the EU. These key services should be available online by 2015. | In 2011:<br>• following the adoption in 2010 of the eGovernment Action Plan 2011-2015, the EC will launch a study to analyse the existing and future needs and cost benefit of cross-border services for citizens and businesses and assess the organisational, legal, technical and semantic barriers, together with the MSs;<br>• MSs will agree on a number of key cross-border public services to be rolled out between 2012-2015. | eGovernment Action Plan 2011-2015 (further in this section) |

The European eGovernment Action Plan 2011-2015 supports

> *"the transition from current eGovernment to a new generation of open, flexible and collaborative seamless eGovernment services at local, regional, national and European levels that will empower citizens and businesses."* [17]

The role of national governments is to implement the action plan, while the EC's main responsibility is to improve the conditions (such as interoperability, eSignatures, and eIdentification) for development of cross-border eGovernment services provided to citizens and businesses regardless of their country of origin [17].

The one of the actions titled "2.4. Pre-conditions for developing eGovernment" is directed towards the promotion of interoperability across borders through open specifications and the development of key enablers such as electronic identity management and stimulation of innovation in eGovernment. The other action which is of interest in the context of interoperability is "2.2. Internal Market" supporting the internal market of the EU through development of seamless services for businesses and citizens. Both actions are described in detail in Table 3.2.

Table 3.2

Actions of the eGovernment Plan 2011-2015 relevant to the context of interoperability [17]

| Sub-action | Explanation | Time scale | Description of specific actions | Reference |
|---|---|---|---|---|
| **2.4. Pre-conditions for developing eGovernment** | | | | |
| 2.4.1. Open Specifications and Interoperability | Standards and open platforms offer opportunities for more cost-effective use of resources and delivery of services. The envisaged actions will lead to development of a common strategy for achieving interoperability between MSs at European level | 2011-2015 | The EC (via the ISA programme) will implement activities to put into action the EIF and the EIS (adoption of the EIF and EIS expected in 2010) | ISA programme (see section 6.2)<br><br>EIF (see section 5.2)<br><br>EIS (see section 5.1) |
| | | 2012 | The EC will organize exchanges of expertise and promote the re-use and sharing of solutions to implement interoperable eGovernment services. This includes establishment of interfaces to gain access to and use authentic national sources | |
| | | 2013 | MSs should have aligned their NIFs to the EIF | |
| 2.4.2. Key Enablers | For many online services it is essential to identify and authenticate the person or legal entity to whom/which a service will be delivered. There is a need for more secure solutions protecting privacy. The envisaged actions will contribute to build a Pan-European framework for mutually recognized eID. The approach should build on the results of the existent initiatives, in particular STORK | 2011 | The EC will propose a revision of the eSignature Directive with a view to providing a legal framework for cross-border recognition and interoperability of secure eAuthentication systems | eSignature Directive - Directive 1999/93/EC on a Community framework for electronic signatures, 13.12.1999<br><br>STORK (see section 7.5) |
| | | 2012 | The EC will propose a Council and European Parliament Decision to ensure mutual recognition of eIdentification and eAuthentication across the EU, based on online 'authentication services' to be offered in all MSs (which may use the most appropriate official identification documents – issued by the public and private sectors) | |
| | | 2012-2014 | MSs should apply and roll out the eID solutions, based on the results of STORK and other eID-related projects | |

Table 3.2 (continued)

Actions of the eGovernment Plan 2011-2015 relevant to the context of interoperability [17]

| Sub-action | Explanation | Time scale | Description of specific actions | Reference |
|---|---|---|---|---|
| 2.4.3. Innovative eGovernment | The new generation of eGovernment services will need to rely on and benefit from innovative technical approaches, such as clouds of public services and service-oriented architecture (SOA) to build open, flexible and collaborative eGovernment services while at the same time lowering ICT costs. The envisaged actions aim to identify and disseminate tested and safe solutions for clouds of public services, SOA and transition strategies for converting from IPv4 to IPv6 | 2011 | The EC will launch a study and recommend action on how to apply emerging technologies and paradigms (such as SOA and clouds of public services) in the public sector | CIP programme - http://ec.europa.eu/cip/ |
| | | 2011 | The EC will launch activities under the CIP programme to support administrations to pilot the upgrade to IPv6, thereby creating showcases and new momentum for moving to IPv6 on a large scale | |
| | | 2012 | The EC will launch pilot projects to demonstrate how PAs can deliver eGovernment services in a more flexible and efficient way by using innovative architecture and technologies | |
| **2.2.Internal Market** | | | | |
| 2.2.1. Seamless Services for Businesses | Businesses should be able to sell and provide services and products all across the EU, through easy electronic public procurement and the effective implementation of the Services offering single points of contact to businesses for their interactions with government. The actions rely on the existent initiatives have been set up in both areas: SPOCS and PEPPOL | 2011 | MSs and the EC will assess outcomes of PEPPOL and SPOCS and ensure sustainable follow up | SPOCS (see Section 7.4)<br><br>PEPPOL (see Section 7.3)<br><br>Services Directive (see Section 4) |
| | | 2011 | The EC will issue a White Paper on practical steps to inter-connect eProcurement capacity across the internal market | |
| | | 2012-2014 | MSs should roll out cross-border services based on the results of PEPPOL and SPOCS | |
| | | 2013 | MSs will ensure that a 'second generation' of PSCs will function as fully fledged eGovernment centres beyond the requirements and areas covered by the Services Directive | |

Table 3.2 (continued)

Actions of the eGovernment Plan 2011-2015 relevant to the context of interoperability [17]

| Sub-action | Explanation | Time scale | Description of specific actions | Reference |
|---|---|---|---|---|
| 2.2.2. Personal Mobility | The MSs and the EC will work together to develop services for increasing the mobility of people who want to move between European countries for e.g. study, work, health care, residence and/or retirement. The envisaged actions should ensure the development of interoperable services enabling citizens to communicate, perform transactions, send and receive electronic documents and information to and from PAs across the EU | 2012-2014 | The EC will support exchanges of best practice and coordinate the efforts of MSs to jointly develop and set up interoperable eDelivery services | |
| | | 2015 | MSs will provide cross-border and interoperable eDelivery services for citizens, e.g. so that they can study, work, reside, receive health care and retire anywhere in the EU | |
| 2.2.3. EU-wide Implementation of Cross-Border Services | The envisaged actions should provide the prerequisites for the MSs to engage in full deployment throughout the EU of cross-border services and start new ones | 2011 | The EC will conduct a study with the MSs, of the demand for cross-border services and assess the organizational, legal, technical and semantic barriers | |
| | | 2011 | MSs will agree on a number of key cross-border public services to be rolled out between 2012 and 2015 and will identify appropriate life events/stages | |
| | | 2012-2015 | The EC will support and coordinate the efforts of MSs to roll out Large Scale Pilot projects and to start new ones, while encouraging coordination and re-use of results and solutions between them | |
| | | 2012-2015 | The EC will work with MSs and stakeholders to implement cross-border eEnvironment services | |

## 4. HISTORICAL CONTEXT

Historical perspective of the EU initiatives supporting interoperability among PAs is displayed in [19] as it is shown in Figure 4.1.

However, a number of other official documents, events, and initiatives are relevant in the context of interoperability of eGovernment. They are specified in Table 4.1 in chronological sequence and displayed in Figure 4.2.

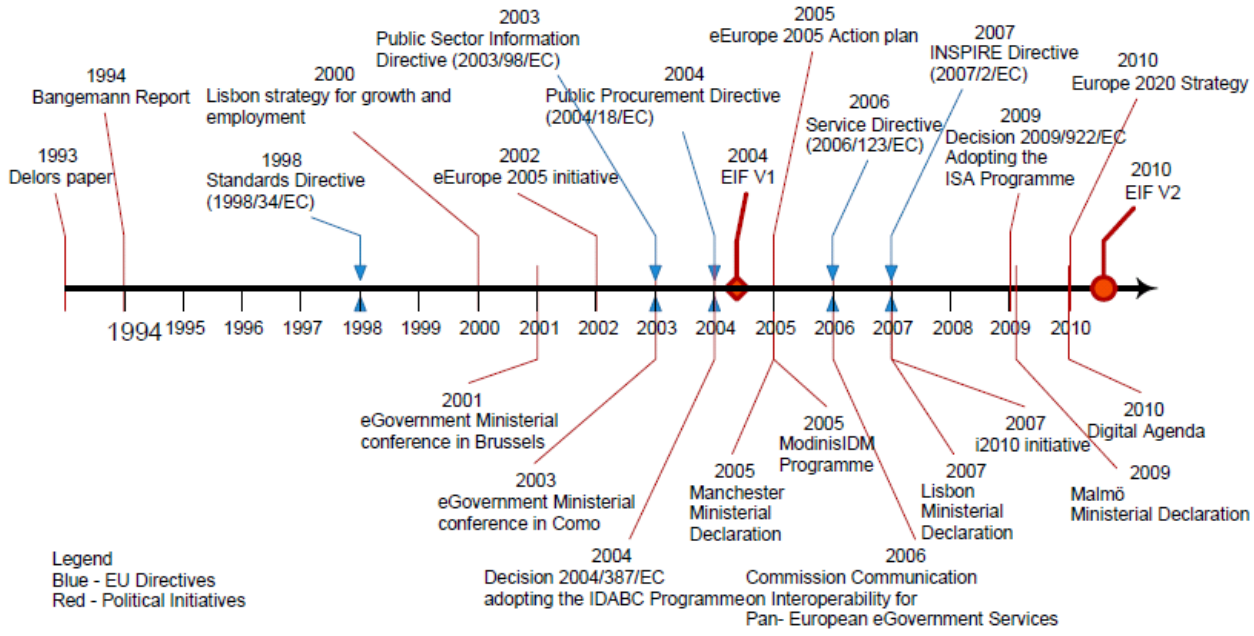



Figure 4.1. Timeline of EU initiatives concerning interoperability (adopted from [19])

Table 4.1

Documents, events, and initiatives relevant in the context of eGovernment interoperability

| Document/Event/Initiative | Relevance to interoperability |
|---|---|
| Decision 95/468/EC on a Community contribution for telematic interchange of data between administrations in the Community (IDA), 06.11.1995 | Adopting the IDA I programme (see Section 6.1) |
| "A European initiative in electronic commerce", COM(97) 157, 16.04.1997, Brussels, Belgium | In the context of promoting a favourable business environment, necessity to promote a more pro-active public section is considered and the following actions are mentioned:<br>• the EC will launch benchmarking initiatives (studies, pilot projects) to learn from practical experience of PAs and to identify specific European needs, including requirements for interoperability in EU;<br>• under the present IDA programme (see Section 6.1), trans-European networks for administrations are being introduced. They will involve commercially available technical solutions whilst interoperability issues will need to be considered by both PAs and the private sector. The EC will issue guidelines to identify projects of common interest (PSI) and implement measures to ensure the interoperability of networks;<br>• the MSs themselves should confirm their confidence in electronic commerce by using it at the various levels of PA. |
| "Ensuring security and trust in electronic communication", COM(97) 503, 08.10.1997, Brussels | Interoperability is mentioned in the context of digital signatures and encryption. There is a necessity to encourage industry and international standards organizations to develop interoperable technical and infrastructure standards for digital signatures and encryption to ensure secure and trustworthy use of networks. In any case, it must be ensured that both regulated and unregulated digital signature schemes can co-exist and are interoperable. One of the accompanying measures is interoperability between different encryption and digital signature applications and systems |
| Decision 1719/1999/EC on a series of guidelines, including the identification of projects of common interest, for trans-European networks for the electronic interchange of data between administrations (IDA), 12.07.1999 | The decision defines as an objective the establishment of operational, interoperable, trans-European telematic networks between MS administrations, whether national or regional, as well as between such administrations and the Community institutions and bodies as appropriate, enabling the efficient, effective and secure interchange of information and describes projects that covers all networks under the IDA II programme (see Section 6.1) |
| Decision 1720/1999/EC adopting a series of actions and measures in order to ensure interoperability of and access to trans-European networks for the electronic interchange of data between administrations (IDA), 12.07.1999 | The decision is a part of the IDA II programme (see Section 6.1). It adopts a series of appropriate actions and measures |

Table 4.1 (continued)

Documents, events, and initiatives relevant in the context of eGovernment interoperability

| Document/Event/Initiative | Relevance to interoperability |
|---|---|
| Directive 1999/93/EC on a Community framework for electronic signatures, 13.12.1999 | The purpose of this directive is to facilitate the use of electronic signatures and to contribute to their legal recognition. It establishes a legal framework for electronic signatures and certain certification-services in order to ensure the proper functioning of the internal market. The interoperability of electronic-signature products should be promoted |
| Action Plan "eEurope 2002: An information society for all", 14.06.2000, Brussels, Belgium | The actions of the plan are clustered around three main objectives. One of them is "3. Stimulate the use of the Internet", where electronic access to public services is mentioned. It includes the following main actions:<br>• essential public data online including legal, administrative cultural, environmental and traffic information by the end of 2002;<br>• MSs to ensure generalized electronic access to main basic public services by the end 2002/3;<br>• simplified online administrative procedures for business e.g. fast track procedures to set up a company by the end of 2002;<br>• develop a coordinated approach for public sector information, including at European level by the end of 2000;<br>• promote the use of open source software (OSS) in the public sector and eGovernment best practice through exchange of experiences across the EU (through the IST and IDA programmes) during 2001;<br>• all basic transactions with the EC must be available online (e.g. funding, research contracts, recruitment, procurement) by the end of 2001;<br>• promote the use of electronic signatures within the public sector by the end of 2001. |
| Action Plan "eEurope+ 2003: A co-operative effort to implement the Information Society in Europe", 06.2001 | The plan is an extension of Action Plan eEurope 2002 to Candidate Countries. It has slightly different actions concerning electronic access to public services:<br>• essential public data online including legal, administrative cultural, environmental and traffic information by the end of 2002;<br>• candidate countries to pursue generalized electronic access to main basic public services by the mid of 2003;<br>• simplified online administrative procedures for business e.g. fast track procedures to set up a company by the end of 2002;<br>• promote the use of OSS in the public sector and eGovernment best practice through exchange of experiences across Europe by the end of 2002;<br>• promote the use of electronic signatures within the public sector by the end of 2002;<br>• establish an e-marketplace for public e-procurement by the end of 2003;<br>• availability of Internet access terminals in public places such as museums, libraries, community centres, etc. by the end of 2002. |

Table 4.1 (continued)

Documents, events, and initiatives relevant in the context of eGovernment interoperability

| Document/Event/Initiative | Relevance to interoperability |
|---|---|
| 1st Ministerial eGovernment Conference, 29-30.11.2001, Brussels, Belgium | Theme: Basic Conditions for eGovernment |
| Ministerial Declaration, 29.11.2001, Brussels, Belgium | The Ministers:<br>• agreed that services must be delivered through several complementary communication channels: online and in traditional ways, with continued opportunities for direct human contact and assistance where necessary;<br>• recognized that interoperability of a variety of network infrastructures and services will therefore be essential, and open standards and "technology-neutral" regulation are vital;<br>• invited the EC to make the necessary investments in research and technological development, in particular in the sixth Framework Programme, to ensure interoperability and dependability in the next generations of infrastructures and open systems. |
| Action Plan "eEurope 2005: An information society for all", COM(2002)263, 28.05.2002, Brussels | The plan states that by 2005 Europe should have modern online public services, inter alia eGovernment. Interoperability is mainly mentioned under the sub-action "3.1 Policy measures, 3.1.1. Modern online public services, i) eGovernment": by the end of 2003, the EC will issue an agreed interoperability framework to support the delivery of pan-European eGovernment services to citizens and enterprises |
| Decision 2045/2002/EC, 21.10.2002 | Amending Decision No 1720/1999/EC (before in this section) |
| Decision 2046/2002/EC, 21.10.2002 | Amending Decision No 1719/1999/EC (before in this section) |
| 2nd Ministerial eGovernment Conference, 07-08.07.2003, Como, Italy | Different aspects of interoperability are considered in all themes |
| Ministerial Declaration, 07-08.07.2003, Como, Italy | The Ministers:<br>• recognized that cooperation required to develop pan-European services depends in part on the interoperability of ICT systems used at all levels of government;<br>• agreed that research is needed at European level in order to identify solutions enabling the sharing of documentation resources and procedures that allow the development of trans-border online services;<br>• promised to encourage their administrations to redefine systems and processes in order to coordinate better the actions of different levels of government, by using open standards;<br>• took note of the increasing interest in the use of OSS in PAs, and welcomed further exchange of experiences between their Countries and the EC. |

Table 4.1 (continued)

Documents, events, and initiatives relevant in the context of eGovernment interoperability

| Document/Event/Initiative | Relevance to interoperability |
|---|---|
| "The Role of eGovernment for Europe's Future", COM(2003) 567, 26.09.2003, Brussels, Belgium | One of the actions is "4.2.6. Interoperability" with the sub-action "interoperability framework in support of the delivery of pan-European eGovernment services to citizens and enterprises as referred to in eEurope 2005, to be adopted in its first version by the end of 2003" |
| Directive 2003/98/EC on the re-use of public sector information, 17.11.2003 | Taking into account that public sector information is an important primary material for digital content products and services, the directive establishes a minimum set of rules governing the re-use and the practical means of facilitating reuse of existing documents held by public sector bodies of the MSs |
| Decision 2256/2003/EC adopting a multiannual programme (2003-2005) for the monitoring of the eEurope 2005 action plan, dissemination of good practices and the improvement of network and information security (MODINIS), 17.11.2003 | Adopting the MODINIS programme (see Section 6.4) |
| European Interoperability Framework for Pan-European eGovernment Services, v.1.0, 2004 | The first version of the EIF developed under the IDA programme (see Section 6.1) |
| Directive 2004/18/EC on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts, 31.03.2004 | The directive describes rules relevant among others to public service contracts |
| Decision 2004/387/EC on interoperable delivery of pan-European eGovernment services to public administrations, businesses and citizens (IDABC), 21.04.2004 | Adopting the IDABC programme (see Section 6.1) |
| Report on "Key Principles of an Interoperability Architecture", 24.06.2004, Irish Presidency of the European Public Administration Network eGovernment Working Group | The report defines and outlines principles for national interoperability architectures. It identifies five interlinked elements for such architectures and provides a possible implementation approach for each one of them |
| "Architecture Guidelines for Trans-European Telematics Networks for Administrations", v.7.1, 09.2004 | The document describes an architecture agreed upon by the IDA programme (see Section 6.1) that enables trans-European networks to interoperate, and thus allows PAs in Europe to interchange data |
| "Working together for growth and jobs: A new start for the Lisbon Strategy", COM(2005) 24, 02.02.2005, Brussels, Belgium | One of the main areas considered in the document is "Making Europe a more attractive place to invest and work" with "3.2.1. Extend and deepen the Single Market". Here, it is stated that public services have a central role in an effective and dynamic single market |

Table 4.1 (continued)

Documents, events, and initiatives relevant in the context of eGovernment interoperability

| Document/Event/Initiative | Relevance to interoperability |
|---|---|
| "i2010 – A European Information Society for growth and employment", COM(2005) 229, 01.06.2005, Brussels, Belgium | Two of priorities included in the strategic framework are:<br>• the completion of a Single European Information Space;<br>• achieving an Inclusive European Information Society.<br>The creation of a Single European Information Space addresses several challenges and one of them is interoperability. As a result, one of the measures provided is "identify and promote targeted actions on interoperability, particularly digital rights management (2006/2007)".<br>The attention is also paid to the problem how to make public services better, more accessible, and more cost-effective. Here, the EC objective is to develop an Inclusive Information Society:<br>• to adopt an Action Plan on eGovernment and strategic orientations on ICT-enabled public services-2006;<br>• to launch demonstrator projects to test, at an operational scale, technological, legal and organizational solutions to bringing public services online - 2007. |
| "eAccessibility", COM(2005) 425, 13.09.2005, Brussels, Belgium | The EC proposes a set of policy actions that foster eAccessibility and notes lack of interoperable solutions for accessible ICT |
| 3rd Ministerial eGovernment Conference, 24-25.11.2005, Manchester, UK | Parallel Session 9: Interoperability and open standards |
| Ministerial Declaration, 24.11.2005, Manchester, UK | The Ministers recognized that transformed public services can contribute significantly to the achievement of the Lisbon goal. The Ministers set the following targets:<br>• all citizens, including socially disadvantaged groups, become major beneficiaries of eGovernment - 2010;<br>• European citizens and businesses benefit from secure means of electronic identification - 2010;<br>• MSs have an agreed framework for reference to and where appropriate the use of authenticated electronic documents across the EU - 2010.<br>Respect for, and recognition of, different forms of eID to achieve interoperability are therefore key principles for future eGovernment development. Interoperable eIDs meeting recognized international standards and built on stable technologies are considered to be a foundation for secure cross-border eGovernment services. Related actions are the following:<br>• during 2006, MSs agree a process and roadmap for achieving the electronic identity objectives and address the national and European legal barriers to the achievement of the electronic identity objectives;<br>• over the period 2006-2010 MSs work towards the mutual recognition of national electronic identities by testing, piloting and implementing suitable technologies and methods;<br>• by 2010, MSs agree a framework for reference to, and where appropriate the use and sustainable archiving of, authenticated electronic documents. |

Table 4.1 (continued)

Documents, events, and initiatives relevant in the context of eGovernment interoperability

| Document/Event/Initiative | Relevance to interoperability |
|---|---|
| "Interoperability for pan-European eGovernment services", COM(2006) 45, 13.02.2006, Brussels, Belgium | The document sets out the basic requirements for implementing pan-European interoperability of eGovernment services, outlines priorities in a structured set of policies and measures for achieving interoperability of eGovernment services in the pan-European context and proposes further action as first steps to fill in this framework |
| "European Parliament resolution on a European information society for growth and employment", 2005/2167(INI), 14.03.2006, Strasbourg, France | The European Parliament calls on the MSs to invest more heavily in the exploitation of ICT in public sector services, such as health, education, and government, in which ICT can make it easier to respond to future social service needs and to cooperate in order to develop pan- European services and for emphasis to be given to the issues of interoperability and best practices in public-sector electronic services for citizens and undertakings in matters of taxation, health, insurance cover and pensions etc., with the overriding objective of facilitating the free and unimpeded movement, establishment and employment of citizens in the MSs, as well as urges national governments to implement i2010 initiatives and programmes in the reform of their PA in order to provide better, more efficient and more easily accessible services to their SMEs, as well as their citizens |
| "i2010 eGovernment Action Plan: Accelerating eGovernment in Europe for the benefit of all", COM(2006) 173, 25.04.2006, Brussels, Belgium | With this Action Plan the EC seeks to ensure that eGovernment at national level does not lead to new barriers on the single market due to fragmentation and lack of interoperability. The Action Plan focuses on five major objectives for eGovernment with specific objectives for 2010. One of them is putting key enablers in place - enabling citizens and businesses to benefit, by 2010, from convenient, secure and interoperable authenticated access across Europe to public services. Interoperable electronic identification management (eIDM) for access to public services, electronic document authentication and electronic archiving are considered critical key enablers. The following actions are considered:<br>• 2006 - agree with MSs on a roadmap setting measurable objectives and milestones on the way to a European eIDM framework by 2010 based on interoperability and mutual recognition of national eIDM;<br>• 2007 - agree common specifications for interoperable eIDM in the EU;<br>• 2008 - monitor large scale pilots of interoperable eIDMs in cross-border services and implementing commonly agreed specifications;<br>• 2009 - eSignatures in eGovernment: undertake review of take-up in public services;<br>• 2010 - review the uptake by the MSs of the European eIDM framework for interoperable eIDMs. |
| Decision 1639/2006/EC establishing a Competitiveness and Innovation Framework Programme (2007 to 2013), 24.10.2006 | Adopting the ISP PSP programme (see Section 6.3) |

Table 4.1 (continued)

Documents, events, and initiatives relevant in the context of eGovernment interoperability

| Document/Event/Initiative | Relevance to interoperability |
|---|---|
| Directive 2006/123/EC on services in the internal market, 12.12.2006 | Regarding the internal market, the directive obliges MSs to offer service providers the possibility of completing electronically and across borders all procedures and formalities needed to provide a service outside their home country. It calls on MSs to establish PSCs to help service-providers enter their markets. It requires all procedures involved in establishing a business and providing services in another EU country to be fully online |
| Directive 2007/2/EC on establishing an Infrastructure for Spatial Information in the European Community (INSPIRE), 14.03.2007 | Regarding the environment, the directive establishes an infrastructure for spatial information in Europe for the purposes of EU environmental policies and policies or activities which may have an impact on the environment. To ensure that the spatial data infrastructures of the MSs are compatible and usable in a Community and trans-boundary context, the directive requires that common implementing rules are adopted in a number of specific areas (Metadata, Data Specifications, Network Services, Data and Service Sharing and Monitoring and Reporting) |
| 4th Ministerial eGovernment Conference, 19-21.09.2007, Lisbon, Portugal | Parallel Session 1: eGovernment for businesses<br>Parallel Session 2: eGovernment for citizens<br>Different aspects of interoperability are considered in other sessions, as well |
| Ministerial Declaration, 19.09.2007, Lisbon, Portugal | The Ministers recognized that the MSs shall intensify efforts to achieve cross-border interoperability, the importance of which has already been highlighted in the electronic identity and eProcurement areas. To achieve the ambitious i2010 Manchester targets and Action Plan objectives, MSs shall also keep-up the momentum in the several policy priorities, one of them is the common EU policy objective to reinforce cross-border interoperability and reduce administrative burdens requires MSs to identify services and actions which can transform and simplify the way citizens access public services. As a result, the Ministers agreed on the following priority policy actions “Cross-border Interoperability” including reinforcement of the cooperation among MSs, definition and openness of technical standards and publicly available specifications, identification of the areas in which MSs would cooperate and determine, with the EC, the appropriate modus operandi to define, develop, implement and monitor broad cross-border interoperability generally required for the implementation of the Services Directive, acceleration of the eID for citizen and business and eProcurement activities. By the end of 2008 MSs shall establish a list of new priority areas for high impact services, which can be further developed at the pan-European level with the support of EU programmes. The Ministers invited the EC to a) facilitate cooperation among MSs and the EC to define, develop, implement and monitor cross-border, cross-sectoral interoperability, and b) finalize by mid-2008 the related work under the programme on the Interoperable Delivery of European eGovernment Services to public Administrations, Businesses and Citizens (IDABC) and propose a revised version of the EIF to foster the development of interoperable European eGovernment services, in close cooperation with MSs. |

Table 4.1 (continued)

Documents, events, and initiatives relevant in the context of eGovernment interoperability

| Document/Event/Initiative | Relevance to interoperability |
|---|---|
| Report "European Interoperable Infrastructure Services: Study on potential reuse of system components", v.1.1, 2009 | The study identifies components of an interoperability infrastructure to support European public services and proposes a high-level roadmap for their implementation |
| Decision 922/2009/EC on interoperability solutions for European public administrations (ISA), 16.09.2009 | Adopting the ISA programme (see Section 6.2) |
| 5th Ministerial eGovernment Conference, 18-20.11.2009, Malmö, Sweden | Parallel Session 11: Understanding Each Other – the Importance of Interoperability |
| Ministerial Declaration on eGovernment, 18.11.2009, Malmö, Sweden | The Ministers recognized that better public services need to be delivered with fewer resources, and that the potential of eGovernment can be increased, inter alia by improving the conditions for interoperability of PAs. It is emphasized that the implementation of the policy priorities is made possible by appropriate key enablers and legal and technical preconditions by 2012. There, it is pointed out that PAs should:<br>• pay particular attention to the benefits resulting from the use of open specifications in order to deliver services in the most cost-effective manner. The Ministers took responsibility to ensure that open specifications are promoted in NIFs and to work to align NIFs with applicable European frameworks;<br>• regard innovation as an integral part of working. The Ministers took responsibility to promote innovation in eGovernment services through research and development, pilot projects and other implementation schemes, to explore and develop the possibilities offered by new open and flexible service architectures and new computing paradigms.<br>Interoperability is also mentioned in relation to the single market and mobility which reinforced by seamless eGovernment services for the setting up and running of a business and for studying, working, residing and retiring anywhere in the EU. PAs should therefore:<br>1. create a noticeable and positive change in the ease with which a business can be set up and run in the Single Market. The Ministers took responsibility to enable and support the creation of seamless cross-border eGovernment services, to increase the trustworthiness, security and interoperability of them;<br>2. create a noticeable and positive change in the ease with which citizens can study, work, reside and retire in any MS. The Ministers took responsibility to enable and support the creation of seamless cross-border eGovernment services by focusing our efforts on these life-stages.<br>The Ministers further invited the EC to take appropriate measures to support the objectives of this declaration: identify gaps in cross-border interoperability and mutual recognition and intensify the activities on key enablers such as trustworthy electronic identity, electronic signatures and electronic documents, and continue developing a joint infrastructure. |

Table 4.1 (continued)

Documents, events, and initiatives relevant in the context of eGovernment interoperability

| Document/Event/Initiative | Relevance to interoperability |
|---|---|
| Council Conclusions on "Post i-2010 Strategy - towards an open, green and competitive knowledge society", 18.12.2009 | The document, with regard to eGovernment, emphasizes specifically:<br>• that efficiency and effectiveness should be enabled by a constant effort to use eGovernment in innovative ways through the use of eGovernment services based on open and interoperable standards across the single market;<br>• that in order to effectively implement these policy priorities, appropriate key enablers and legal and technical preconditions, such as interoperable electronic identities, electronic signatures, and electronic documents are very important;<br>• that promoting open ICT standards will facilitate interoperability, technological progress and extend the use of ICT to citizens and businesses. |
| "EUROPE 2020 - A strategy for smart, sustainable and inclusive growth", COM(2010) 2020, 03.03.2010, Brussels, Belgium | Adopting the Europe 2020 strategy (see Section 3) |
| Granada Ministerial Declaration on the European Digital Agenda, 19.04.2010 | In the declaration, the action related to advanced use of the open Internet, security and trust and especially increase the strength of a smart, sustainable and inclusive European Digital Economy by promoting inter alia smart and open public services such as e-health and eGovernment is mentioned. In relation to public digital services the following actions are specified:<br>• respond to the Malmo Declaration on eGovernment by developing more effective and efficient interoperable public services;<br>• ensure the implementation of eGovernment strategies at an organizational, legal and technical level including eID and eSignatures;<br>• embed innovation and cost effectiveness into eGovernment through the systematic promotion of open standards and interoperable systems, development of EU wide e-authentication schemes and proactive development of e-invoicing, e-procurement (and pre-commercial procurement). |
| Council conclusions on Digital Agenda for Europe, 31.05.2010 | The Council of the EU acknowledges the importance of the Digital Agenda for Europe:<br>• that wider deployment and more effective use of digital technologies can provide Europeans with a better quality of life through, for example, better health care, safer transport, new media opportunities and easier access to goods and services, including public services, and cultural content, in particular across borders;<br>• that Europe should put the necessary resources in the development of a digital single market based on fast and ultra fast Internet and interoperable applications in order to use its full potential to raise productivity and generate economic growth and attract investments, create jobs and reinforce its influence at a global level and endorses to enhance interoperability of IT solutions in Europe and promote a better use of standards. |

Table 4.1 (continued)

Documents, events, and initiatives relevant in the context of eGovernment interoperability

| Document/Event/Initiative | Relevance to interoperability |
|---|---|
| "A Digital Agenda for Europe", COM(2010) 245, 26.08.2010, Brussels, Belgium | Adopting the Digital Agenda for Europe (see Section 3) |
| The European eGovernment Action Plan 2011-2015 "Harnessing ICT to promote smart, sustainable & innovative Government", COM(2010) 743, 15.12.2010, Brussels, Belgium | Priority "2.4. Pre-conditions for developing eGovernment, 2.4.1. Open Specifications and Interoperability" with the following actions:<br>• 2011-2015: implementation of activities to put into action the EIF and the EIS;<br>• 2012: exchange of expertise and promotion of re-use and sharing of solutions to implement interoperable eGovernment services;<br>• 2013: alignment of NIFs to the EIF by MSs. |
| "Towards interoperability for European public services", COM(2010) 744, 16.12.2010 | The document contains the approved EIS and the EIF as its annexes |
| "European Interoperability Architecture: Phase 2 – Final Report: Common Vision for an EIA", v.2.0, 11.2011 | The study explores the need for a EIA facilitating the establishment of European public services (cross - border eGovernment services). It contributes to the objectives in reaching a common vision for such architecture and proposing concrete implementation actions for the architecture, including an assessment of the need and relevance of having common infrastructure services as part of the architecture |
| 6th Ministerial eGovernment Conference, 17-18.11.2011,Poznań, Poland | Track 2: Interoperability Summit |

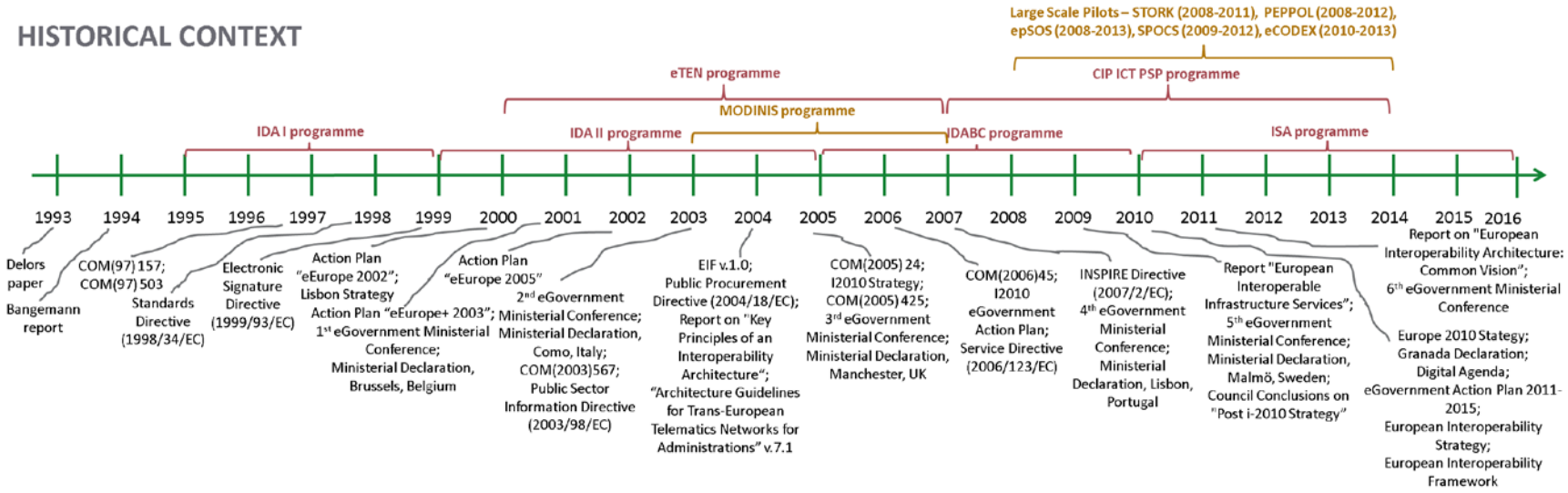
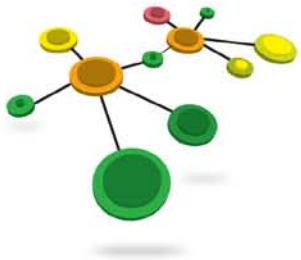



Figure 4.2. Timeline of EU documents, events, and initiatives concerning interoperability



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# 5. INTEROPERABILITY INITIATIVES

As it was mentioned in Section 2.6, interoperability is promoted by several initiatives. The EIS [1] and the EIF [19] are considered to be two key elements in the Digital Agenda (see Section 3) together forming the basis for future activities intended to improve interoperability for delivering European public services [3].

According to [3], implementation of the EIS in the light of the EIF requires the following separation of roles:

- the EC will:
  - implement the EIS through appropriate instruments such as the ISA programme (see Section 6.2) and the CIP ICT PSP programme (see Section 6.3), in close cooperation with MSs and other stakeholders;
  - align its internal interoperability strategy with the EIS through the eCommission initiative;
  - ensure that the EIF is applied when implementing new legislation and establishing new European public services;
  - ensure the governance of the EIS and related global and sectoral interoperability activities, in close coordination with MSs.
- MSs should:
  - align national interoperability strategies with the EIS and national initiatives and actions with corresponding initiatives and actions at EU level;
  - work with each other and with the EC on implementing the EIS, while monitoring the progress and impact of related actions at national level;
  - align their NIFs with the EIF;
  - take into account the European dimension at an early stage in the development of any public service that might become part of European public services in future;
  - contribute to the governance of the EIS and related interoperability activities.

## 5.1. THE EUROPEAN INTEROPERABILITY STRATEGY

The EIS was developed by the EC's Directorate-General for Informatics [1] in cooperation and agreement with the MSs and accepted in 2010. The strategy was prepared during the IDABC programme (see

Section 6.1) and finalised after a public consultation under the ISA programme (see Section 6.2) which maintains it [1]. It is directly steered by the CIOs of the MSs [20].

To achieve the European-wide effective and efficient delivery of public services, activities at EU and MS level should be coordinated. In addition, interoperability governance at EU level should be established [3]. The EIS is at the top of the governance pyramid (Figure 2.9) and it sets common, coherent approach and provides basis for an organizational, financial, and operational framework to support cross-border and cross-sectoral interoperability [3, 19]. The EIS aims to provide guidance and to prioritise the actions needed to improve interaction, exchange, and cooperation among European PAs across borders and across sectors for the delivery of European public services [1].

Principles

Activities of the EIS follow a defined set of principles which are described in Table 5.1.

Table 5.1

EIS principles (adopted from [20])

| Principle | Explanation |
|---|---|
| Green | The EIS activities will be reusable, based on sustainable approaches |
| Transparent | The EIS activities are transparent and offer the possibility of traceability |
| Openness and innovation | EIS activities are open, conforming to standards, allowing further developments and improvements and are vendor-independent |
| Continuous improvement | EIS activities are based on continuous assessment and improvement |
| Community of shared interest | EIS activities serve a community of shared interest. This can be on various levels: interoperability expert's community, European public services community or even the larger European community |
| Trust | EIS activities are based on mutual trust. PAs should be assured that all transactions are secure, reliable, and trustworthy |

Overall strategic approach

According to [1], to drive European interoperability activities, the EC proposes to combine two approaches:

- top-down (or global) approach:
  - the political context and its evolution are taken into account: the Europe 2020 strategy (see Section 3) and the Digital Agenda for Europe (see Section 3);

- development of various frameworks such as the EIS, the EIF, architecture guidelines and other methods and guidelines;
- assessment of the ICT implications of new EU legislation proposed.

- bottom-up (or sectoral) approach:
  - working via sectoral projects on relevant specific topics (e.g. semantics, trust and privacy or architecture) providing an opportunity to tackle real interoperability challenges. This approach will allow existing frameworks and guidelines to be tested against concrete needs and will furthermore ensure that new services and tools are developed based on clearly defined needs;
  - when developing new services and tools in a specific sector, the potential for reusing such solutions in other sectors should be kept in mind.

European interoperability activities are divided in the EIS in three clusters and two accompanying measures (Table 5.2).

Next steps and continuous updating

Next steps related to the EIS are defined in [1] as follows:

- the next challenge is to convert the EIS into a set of concrete projects and results. The projects will mostly constitute the ISA work programme (see Section 6.2);
- during establishment of the ISA work programme (see Section 6.2), various actions will be defined and initiated to implement the EIS. Project managers will be identified and objectives for individual actions will be drawn up to make significant progress towards the goals set for each interoperability cluster;
- adequate project monitoring and reporting will support implementation of the interoperability initiatives, which will entail defining suitable metrics for each action, e.g. key performance indicators. Monitoring and reporting will allow performance to be tracked against targets and actions to be assessed to see if they are on track to meet their objectives;

Table 5.2

EIS activities [1, 20]

| Main components | Goal | Specific activities |
|---|---|---|
| **Clusters** | | |
| Trusted Information Exchange | Defines how information needs to be treated to be able to achieve interoperability | • to work via a limited number of politically relevant and concrete sectoral projects at EU and MS levels;<br>• to continue supporting, at EU level, efforts towards the interoperability of key enablers (eID, eSignature, etc.);<br>• to continue the SEMIC approach (see Section 6.1) and its methodology;<br>• to work towards opening up base registers, taking into account associated best practices, the possible related risks and opportunities, as well as the various needs and expectations of the main stakeholders;<br>• to work towards the establishment of a federated catalogue of services offered by PAs in the EU. |
| Interoperability Architecture | Defines how the infrastructure needs to be organised to obtain interoperability | • to develop a joint vision on interoperability architecture by first defining its scope and the needs for common infrastructure services and common interface standards;<br>• to provide guidance on architecture domains where MSs share a common interest;<br>• to ensure the systematic reuse of architectural building blocks by the EC when developing services to be used by the MSs. Here, existing infrastructure service components along with generic applications (IMI, early alert systems, grant management, etc.) could be reused and rationalised. Additionally, a catalogue of architectural building blocks available for reuse by the MSs and the EC could be set up with contributions from the EU and MSs. |
| Assessment of the ICT Implications of New EU Legislation | Defines what the legal framework is in which interoperability can operate | • to develop guidelines and methodologies at EC and MS level;<br>• to test the usefulness of these guidelines by applying them to concrete cases involving policymakers and legal and ICT experts;<br>• to ensure continuous improvement of the guidelines and methodologies based on the lessons learned from experience;<br>• to ensure general application of the practice of assessing ICT implications towards a more systematic approach whenever changes occur in legislation (e.g. amendments or additions to ICT-related legislation). |
| **Accompanying measures** | | |
| Raising Interoperability Awareness | Defines measures needed to achieve the objectives of the EIS | • to develop an overall communication approach;<br>• to organise communication campaigns, initially targeting decision-makers but then gradually shifting to more operational and technical levels;<br>• to develop a self-assessment tool/model for PAs to assess their interoperability maturity level. |
| Sharing Best Practices | | • to work towards the convergence of existing EU collaborative platforms and to ensure the sustainability of the platforms used;<br>• to maintain, where relevant, the existing communities at EU level around sharing best practices and reusing common solutions;<br>• to support the creation of potential new communities resulting from other interoperability activities. |

- a comprehensive portfolio management framework will be used to generate a common view and to produce a roadmap of every action under way or planned. Portfolio management will produce a multidimensional view of the project portfolio, in order to assess each action in the light of the EIS, and will clearly highlight which actions are adding value to the interoperability vision. Based on the overall picture, the relative cost of each action can be balanced against its potential to create value. For example, some actions might have high potential value but a prohibitive risk. Others might be redefined to modify their risk profiles;
- adequate portfolio management will ensure the necessary tradeoffs between finite resources, risks, scopes and timing against expected outcomes as the environment changes (including political and other stakeholder priorities reflected in updated strategy objectives). Other key action related to project management governance will be communication with stakeholders on the project portfolio.

In [20], it is pointed out that the EIS needs to be reviewed and updated on a regular basis taking the environment and external challenges into account. Three EIS external challenges to be considered are:

- growth and innovation. New opportunities and possibilities are offered by developing technology and innovation. There is a need to stay compatible with new technologies and emerging concepts. In addition, the level of maturity, awareness, and intellectual capital outside and inside the organisation is growing, offering opportunities for improvement;
- strategic resource management. Changes in priorities require resource reallocation. In addition, periodic changes sometimes require extra resources. This might also have an impact on the resources available for the EIS implementation;
- managing uncertainty and the changing environment. Issues like climate change and environmental concerns drive to search for new ways of working. Political decisions and legal requirements affect and change priorities in organisations. No doubt this will all have an impact on the implementation of the EIS.

ISA programme (see Section 6.2) includes among others an action “Continuously updating the European interoperability strategy - EIS Governance Support” [37]. It takes into account the problem of European public services operating in a complex and changing environment and necessity to ensure interoperability between the legal instruments, business processes, information exchanges and

components that support the delivery of European public services in continuous scale. As a result, this action encompasses both the implementation review of the EIS as well as the revision of the EIS, ensuring the alignment of the long-term vision with short-term actions.

The objectives of the action are [37]:

- monitoring the implementation of the EIS;
- ensuring regular maintenance and evolution of the EIS so that it stays aligned with the EU political agenda and with the priorities and initiatives of the MSs regarding European public services and interoperability.

The expected benefits of the action are [37]:

- ensuring awareness of and strategic alignment between interoperability activities and MSs' related priorities and coherence of interoperability actions at EU and MS levels;
- achieving strategic alignment between interoperability activities and EU policies as well as coherence of interoperability actions within the EC.

The action will be run by the EC's Informatics Directorate-General in close cooperation with the MSs. Twice a year, proposals may be put forward to the EIS steering group regarding strategic directions to be strengthened, changed or new ones to be adopted [37].

Consequently, the EIS Governance Support action will include annual activities aimed at [37]:

- ensuring collection and analysis of new EU policies, MS priorities and initiatives that can have an impact on the implementation of the EIS or on the overall EIS, as well as associated risks and opportunities;
- ensuring the good functioning of the portfolio management activities, including the analysis of project status and value measurement;
- conducting a bi-annual analysis on the possible consequences of new EU policies and MS priorities and of the Project Portfolio Management status regarding the EIS implementation;

- issuing a bi-annual report proposing decisions to be taken on EIS strategic directions and the related impact on the ISA Work Programme (see Section 6.2), the EIF and on other EU initiatives, if relevant.

Alongside EIS governance activities, an evaluation of the level of performance in implementing the EIS will be undertaken through two complementary actions of the ISA Work Programme (see Section 6.2) [37]:

- a Maturity Model – a self-assessment tool for administrations to evaluate their level of maturity in the field of interoperability;
- Key Performance Indicators – an assessment which reflects the performance of clustered projects in terms of value, risk and progress.

## 5.2. THE EUROPEAN INTEROPERABILITY FRAMEWORK

According to [19],

> *"an interoperability framework is an agreed approach to interoperability for organisations that wish to work together towards the joint delivery of public services. Within its scope of applicability, it specifies a set of common elements such as vocabulary, concepts, principles, policies, guidelines, recommendations, standards, specifications and practices."*

The first version of the EIF was approved in October 2004, and first published on the IDA (see Section 6.1) website in November 2004 [38]. In 2010, the second version was approved. The EIF is maintained under the ISA programme (see Section 6.2), in close cooperation between the MSs and the EC [19].

The EIF is a non-technical document with the following main purposes [19]:

- to promote and support the delivery of European public services by fostering cross-border and cross-sectoral interoperability;
- to guide PAs in their work to provide European public services to businesses and citizens;
- to complement and tie together the various NIFs at European level.

Therefore,

*"the EIF is the overarching set of policies, standards and guidelines which describe the way in which organisations have agreed, or should agree, to do business with each other."* [38]

The target audience of the EIF addresses all those involved in defining, designing and implementing European public services [19], for example, managers of eGovernment projects in MSs Administrations and EU bodies, MSs Administrations, European Institutions and Agencies [31].

The EIF is applied when [19]:

- making decisions on European public services that support the implementation of EU policy initiatives;
- establishing public services that in the future may be reused as part of European public services.

The EIF covers the following content [26]:

- 25 recommendations for PAs;
- 12 underlying principles;
- the conceptual model for public services;
- 4 levels of interoperability;
- the concept of interoperability agreements;
- the governance of interoperability.

Recommendations

The EIF contains the following 25 recommendations for PAs [19]:

- Recommendation 1. PAs should align their interoperability frameworks with the EIF to take into account the European dimension of public service delivery.
- Recommendation 2. PAs should ensure that public services are accessible to all citizens, including persons with disabilities and the elderly, according to e-accessibility specifications widely recognised at European or international level.
- Recommendation 3. PAs should consider the specific needs of each European public service, within the context of a common security and privacy policy.

- Recommendation 4. PAs should use information systems and technical architectures that cater for multilingualism when establishing a European public service.
- Recommendation 5. PAs should formulate together a long-term preservation policy for electronic records relating to European public services.
- Recommendation 6. PAs should aim for openness when working together to establish European public services, while taking into account their priorities and constraints.
- Recommendation 7. PAs are encouraged to reuse and share solutions and to cooperate on the development of joint solutions when implementing European public services.
- Recommendation 8. PAs should not impose any specific technological solution on citizens, businesses and other administrations when establishing European public services.
- Recommendation 9. PAs should develop a component-based service model, allowing the establishment of European public services by reusing, as much as possible, existing service components.
- Recommendation 10. PAs should agree on a common scheme to interconnect loosely coupled service components and put in place the necessary infrastructure when establishing European public services.
- Recommendation 11. PAs should make their authentic sources of information available to others while implementing access and control mechanisms to ensure security and privacy in accordance with the relevant legislation.
- Recommendation 12. PAs, when working to establish European public services, should develop interfaces to authentic sources and align them at semantic and technical level.
- Recommendation 13. PAs, when working together to establish European public services, should use a common taxonomy of basic public services and agree on minimum service requirements for secure data exchange.
- Recommendation 14. PAs should carefully consider all relevant legislation relating to data exchange, including data protection legislation, when seeking to establish a European public service.
- Recommendation 15. PAs should document their business processes and agree on how these processes will interact to deliver a European public service.

- Recommendation 16. PAs should clarify their organisational relationships as part of the establishment of a European public service.
- Recommendation 17. PAs working together to provide European public services should agree on change management processes to ensure continuous service delivery.
- Recommendation 18. PAs should support the establishment of sector-specific and cross-sectoral communities that aim to facilitate semantic interoperability and should encourage the communities to share results on national and European platforms.
- Recommendation 19. PAs should agree on the formalised specifications to ensure technical interoperability when establishing European public services.
- Recommendation 20. PAs, when establishing European public services, should base interoperability agreements on existing formalised specifications, or, if they do not exist, cooperate with communities working in the same areas.
- Recommendation 21. PAs should use a structured, transparent and objective approach to assessing and selecting formalised specifications.
- Recommendation 22. When establishing European public services, PAs should prefer open specifications, taking due account of the coverage of functional needs, maturity and market support.
- Recommendation 23. PAs should lead or actively participate in standardisation work relevant to their needs.
- Recommendation 24. PAs should ensure that interoperability is ensured over time when operating and delivering a European public service.
- Recommendation 25. PAs should establish a framework for the governance of their interoperability activities across administrative levels.

Principles

The underlying principles illustrate the context in which European pubic services are established and implemented. They summarize the expectations of PAs, business, and citizens regarding the delivery. Despite their different political, legal, or technical natures, the principles complement one another [26] and can be grouped together in three categories (Table 5.3).

Table 5.3

EIF underlying principles [19]

| Category | Underlying principle |
|---|---|
| Sets the context for EU Action | 1: Subsidiarity and proportionality. The EU only takes action when this is more effective than action taken at national, regional, or local levels and EU action is limited to what is necessary to achieve agreed objectives |
| Reflects generic user needs and expectations | 2: User-centricity. The needs of citizens and businesses determine what public services are provided and how they are delivered. Generally speaking, citizens and businesses will expect:<br>• to access user-friendly services in a secure and flexible manner allowing personalisation;<br>• multichannel delivery, allowing access to services anyhow, anywhere, anytime;<br>• to access a PSC, even when multiple administrations have to work together to provide the service;<br>• to provide only the information necessary to obtain the public service and to provide any given piece of information only once to administrations;<br>• administrations to respect privacy. |
| | 3: Inclusion and accessibility. Public services should be accessible to all citizens, including persons with disabilities and the elderly, without discrimination |
| | 4: Security and privacy. Citizens' privacy and confidentiality of information provided by businesses must be guaranteed |
| | 5: Multilingualism. Information systems (level of the user interface and all levels in the design of European public services) supporting public services should cater for multilingualism |
| | 6: Administrative simplification. Public services should reduce the administrative burden on businesses from information collection |
| | 7: Transparency. Citizens and businesses should be able to understand and respond to (feedback) administrative processes and decisions that could affect them |
| | 8: Preservation of information. Records and information in electronic form held by administrations for the purpose of documenting procedures and decisions must be preserved. In order to guarantee the long-term preservation of electronic records and other kinds of information, formats should be selected to ensure long-term accessibility, including preservation of associated electronic signatures and other electronic certifications, such as mandates |
| Provide a foundation for cooperation among PAs | 9: Openness. To encourage the sharing of knowledge among interacting organizations and stimulate debate to solve problems |
| | 10: Reusability. PA solutions should be developed to facilitate sharing and reuse |
| | 11: Technological neutrality and adaptability. Specific technological solutions or products should not be imposed on citizens, businesses, and other administrations |
| | 12: Effectiveness and efficiency. Solutions should serve businesses and citizens in the most effective and efficient way, providing the best value for taxpayers' money |

Conceptual model

The conceptual model presented in the EIF suggests ways to organise the creation and operation of public services [26]. It illustrates that a European public service is a combination of existing public services provided at different levels of government and shows where interoperability is needed in such a complex environment [39].

The conceptual model [26]:

- helps develop a common vocabulary and understanding about the main elements of a public service;
- emphasizes a building-block approach, allowing for the interconnection and reusability of service components when building new services;
- is sufficiently generic to be applicable at any level of government that provides public services, from local all the way up to EU level.

The model recognizes that European public services [19]:

- are based on information from various sources located at different levels of administration, in different MSs;
- combine basic public services constructed independently by PAs in different MSs.

Therefore, it highlights the need for modular, loosely coupled service components interconnected through infrastructure and for working together to deliver European public services.

The model is shown in Figure 5.1. Its components are described in detail in Table 5.4. It is flexible due to the fact that it allows different aggregate services to be created by combining basic public services from multiple providers [19].

According to [19], applications of the conceptual model can be shown using three cases, all with a high added value in the EU context.

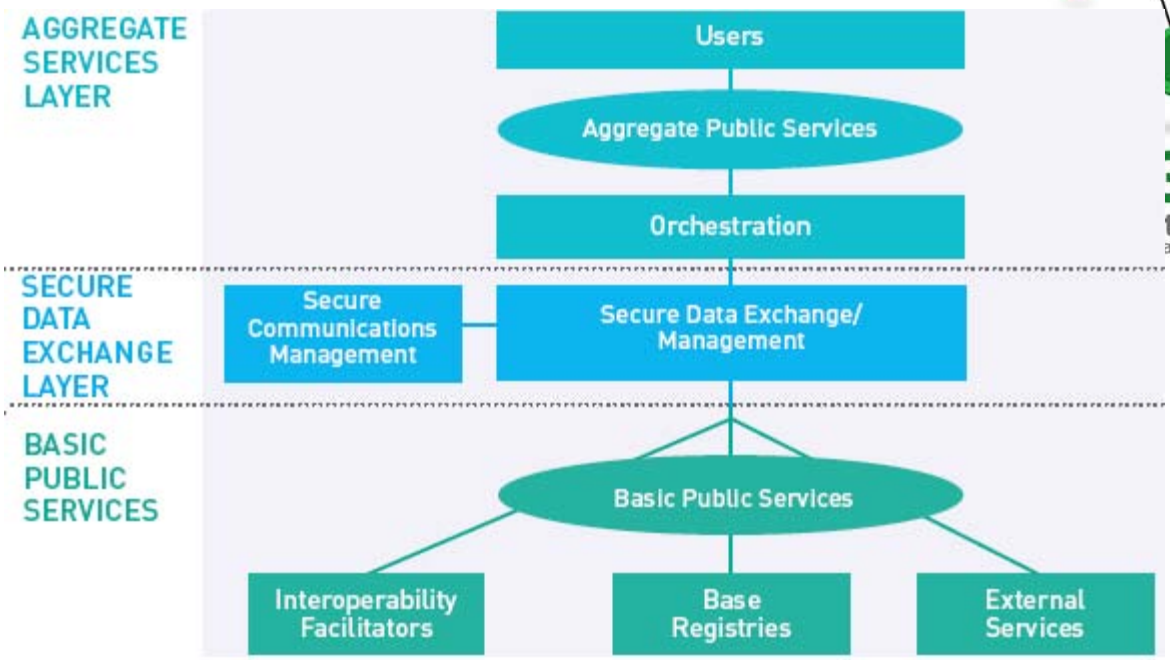



Figure 5.1. The conceptual model of the EIF (adopted from [26])

*Cross-border example*

This illustrates a European public service implemented by combining basic public services, in this case access to national base registries, implemented in different MSs (Figure 5.2).

This raises a number of issues [19]:

- trust. The cross-border application of the model involves allowing external access to national base registries, which requires a high degree of security and trust;
- dependence of European public services and service levels on lower-level services. The aggregated service depends on basic public services provided by different entities;
- common specifications for basic public services. The fact that the basic public services on which the aggregated services are based are developed by different PAs highlights the need for common interface specifications, at technical and semantic level;

  privacy and data protection. Even when personal information is exchanged across borders, national data protection legislations apply. The secure data exchange layer implements and enforces the security requirements for the aggregate service. As data originating from different MSs may be subject to different data protection requirements, a set of common requirements for data protection should be agreed in order to implement the aggregate service.

Table 5.4

Components of the conceptual model [19]

| Layer | Explanation | Components | Description of the component | Notes |
|---|---|---|---|---|
| Basic public services | Deal with the most basic service components from which European public services can be built | Services based on base registries | • provide reliable sources of basic information on items (for example, persons, companies, vehicles, licences, buildings, locations and roads);<br>• are under the legal control of PAs and are maintained by them;<br>• their content is not static;<br>• they are authentic and authoritative and form, separately or in combination, the cornerstone of public services;<br>• the information should be made available for wider reuse with the appropriate security and privacy measures. | Access to authentic data sources across borders will be facilitated if the interfaces to these sources are published and harmonised, at both semantic and technical level |
| | | Interoperability Facilitators | Interoperability facilitators provide services such as translation between protocols, formats, and languages or act as information brokers | |
| | | External Services | External services include services provided by external parties (for example, at business level — payment services provided by financial institutions, at infrastructure level — connectivity services provided by telecommunications providers) | |

Table 5.4 (continued)

Components of the conceptual model [19]

| Layer | Explanation | Components | Description of the component | Notes |
|---|---|---|---|---|
| Secure data exchange | The layer is central to the conceptual model since all access to basic public services passes through it | Secure Data Exchange | Two functions:<br>• transporting data (the secure exchange of certified messages, records, forms, and other kinds of information between the different systems);<br>• handle specific security requirements such as electronic signatures, certification, encryption and time stamping. | Access to base registries should go through a secure, harmonised, managed, and controlled layer allowing information exchanges between administrations, businesses, and citizens that are:<br>• signed and certified — both sender and receiver have been identified and authenticated through agreed mechanisms;<br>• encrypted — the confidentiality of the exchanged data is ensured;<br>• logged – the electronic records are logged and archived to ensure a legal audit trail.<br>Therefore, PAs should agree on a common security framework when establishing a European public service. |
| | | Secure Communications Management | The provision of secure (i.e. signed, certified, encrypted and logged) data exchange also requires several management functions, including:<br>• service management, to oversee all communications on identification, authentication, authorisation, data transport, etc., including access authorisations, revocation, and audit;<br>• service registration, to provide (subject to proper authorisation) access to available services through prior localisation and verification that the service is trustworthy;<br>• service logging, to ensure that all data exchanges are logged for future evidence, and archived when necessary. | |

Table 5.4 (continued)

Components of the conceptual model [19]

| Layer | Explanation | Components | Description of the component | Notes |
|---|---|---|---|---|
| Aggregate services | • aggregate public services are constructed by grouping a number of basic public services that can be accessed in a secure and controlled way;<br>• they can be provided by several administrations at any level, i.e. local, regional, national, or even EU level;<br>• a typical aggregate service should appear to its users (administrations, businesses, or citizens) as a single service;<br>• aggregation is accomplished via mechanisms tailored to specific business requirements. | | | Public services should be developed in such a way that they can easily be integrated in intermediaries' websites through mechanisms such as mash-ups and widgets, without government losing responsibility for the service itself and with clear indications enabling users to tell the difference between private and public services.<br>If aggregate public services are provided by intermediaries, PAs should establish:<br>• a process for authorisation to determine which basic public services may be disclosed to which intermediary;<br>• a process for certifying intermediaries to establish trust between users and service providers. |

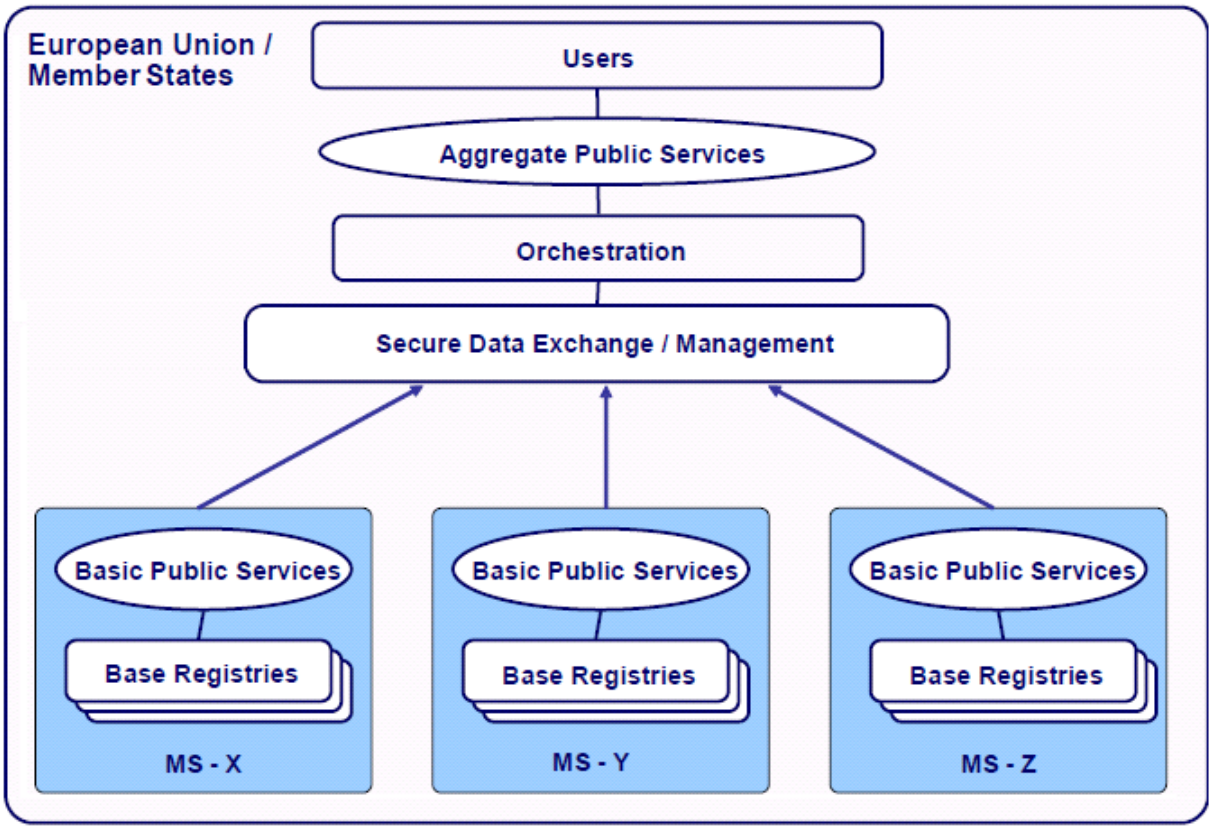



Figure 5.2. Application of the conceptual model: cross-border example (adopted from [19])

*Cross-sectoral example*

This application of the conceptual model (Figure 5.3) combines basic public services from different sectors to provide new aggregate public services. This application of the model channels interaction between users and aggregated public services provided through cooperation between different sectors via a single point of contact. To make this approach successful, it is essential that sectors adopt a common approach to service definition [19].

*Cross-administrative boundary example*

This case (Figure 5.4) illustrates the aggregation of services originating in different layers of government at local, regional, national, and EU level. The challenge for implementing this application is to master the complexity resulting from multiple service providers. Cooperation among PAs at each level is essential.

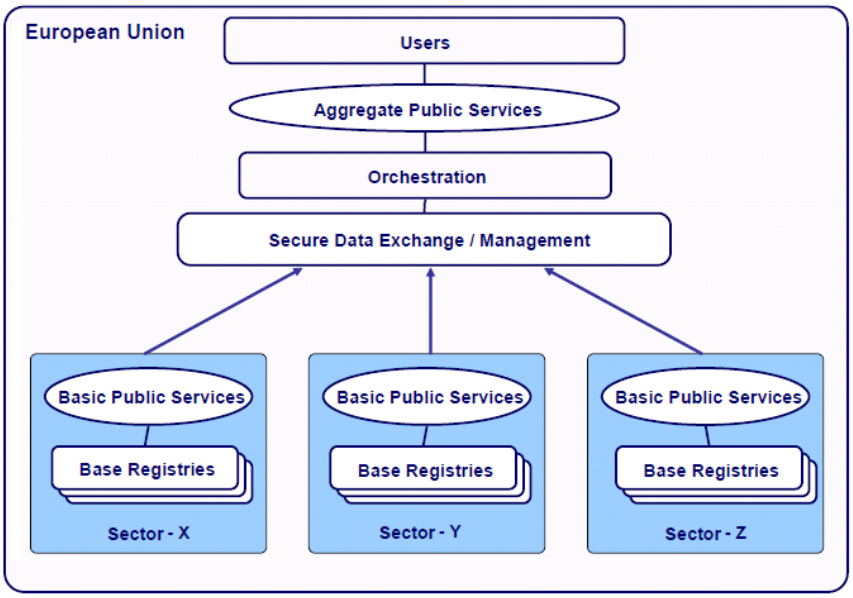



Figure 5.3. Application of the conceptual model: cross-sectoral example (adopted from [19])

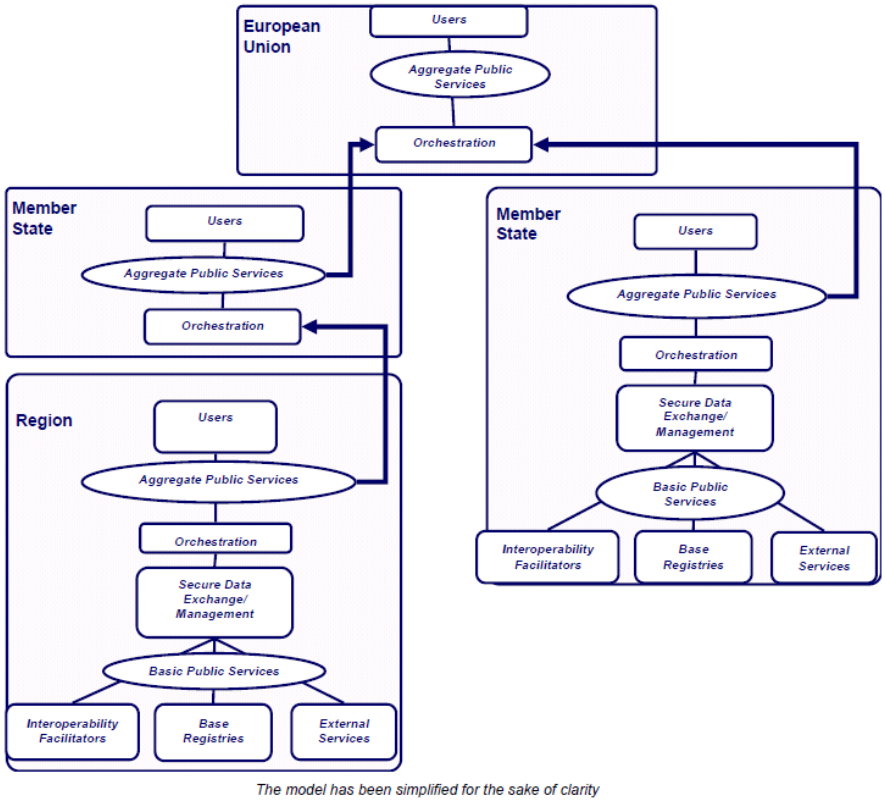



Figure 5.4. Application of the conceptual model: cross-administrative boundary example (adopted from [19])

Interoperability levels

According to [26], the practical implementation of the conceptual model for cross-border/cross-sectoral services requires:

- the political context;
- four levels of interoperability:
  - legal interoperability;
  - organizational interoperability;
  - semantic interoperability;
  - technical interoperability.

Moreover, while PAs have specific characteristics at political, legal, organisational and, partly, semantic level, interoperability at the technical level is not specific to PAs [19].

*Political Context*

In [19], it is pointed out that

> *"the establishment of a new European public service is the result of direct or indirect action at political level, i.e. new bilateral, multilateral or European agreements".*

Therefore, the political context is about creation of favourable conditions for cooperation of partners involved in terms of having compatible visions, high awareness of interoperability issues, aligned priorities, and focusing on the same objectives [30]. Political support and sponsorship is needed in both cases if the establishment of a new service is the direct consequence of new EU legislation and if new services are not directly linked to new legislation but are created to provide better, more user-focused public services [19].

*Legal interoperability*

Establishment and provision of public services needs cooperation of PAs in different MSs. However, each MS has its own national legal framework. As a result, sometimes, incompatibilities between legislation in different MSs make working together more complex or even impossible [19]. Therefore, the legislation in the cooperating MSs must be appropriately synchronised, including according proper legal weight and recognition to electronic data originating in a given MS irrespective of wherever in the EU it needs to be used [30].

In [18], both mentioned things – political context and the legal level of interoperability - are called Governance of interoperability. It is concerned with political, legal, and structural conditions, which are relevant for developing and using interoperable applications. The questions addressed at this layer include:

- Are there any legal constraints and how can these be overcome?
- Which authority is responsible for setting and maintaining the relevant interoperability standards?
- Are the necessary skills in place?
- How can a "collaboration culture" be developed?
- How will change be managed?
- Who decides on the way of collaboration?

*Semantic interoperability*

Semantic interoperability comes from different linguistic, cultural, legal, and administrative environments in the MSs in particular and multilingualism in the EU in general [19]. According to [18], the main semantic conflicts are related to the structure of data and the meaning of data. In the same source, the following categorization of semantic conflicts is considered:

- data-level conflicts are related to differences in data domains caused by the multiple representations and interpretations of similar data:
  - data-value conflicts, e.g. the value "foreigner" in one database may mean that the person is not a citizen of the country, while in another database it may mean that the person is not a citizen of the EU;
  - data representation conflicts, e.g. a date can be represented as 06-30-2005 in one database, as 30-06-2005 in another one and as 30-Jun-2005 in a third database;
  - data unit conflicts, e.g. buildings heights can be measured in centimetres in one database and in inches in another one;
  - data precision conflicts, e.g. buildings heights can be graded as "high", "medium", "low" in one database and as scale A, B, C or D in another one;
  - data language conflicts, e.g. when information is retained in different languages.
- schema-level conflicts are related to differences in logical structures and/or inconsistencies in metadata:

- naming conflicts, e.g. the name “Citizen” in one database is used to capture the same information as the name “Beneficiary” in another database;
- generalisation conflicts, e.g. when one database has a representation for “Citizens”, while a second database has two separate representations for “Males” and “Females”.

Therefore, semantic interoperability is about managing of all semantic conflicts among different systems in a fully automated manner and possibility to add new systems or remove existent one at any time [18]. Semantic interoperability enables organisations to process information from external sources in a meaningful manner and ensures understanding and preservation of the precise meaning of exchanged information [19].

In the context of the EIF, semantic interoperability encompasses the following aspects [19]:

- semantic interoperability is about the meaning of data elements and the relationship between them. It includes developing vocabulary to describe data exchanges, and ensures that data elements are understood in the same way by communicating parties. They are called semantic interoperability assets;
- syntactic interoperability is about describing the exact format of the information to be exchanged in terms of grammar, format, and schemas.

Achieving semantic interoperability requires the following main activities [15, 18, 19]:

- agreements on processes and methodologies for developing semantic interoperability assets;
- development of common data formats/definitions/vocabularies/meta-data for both sector-specific and cross-sector data elements and their relationships;
- agreement on the context in which data elements can be used;
- multilingual support;
- using/exploiting/maintaining/evolving of semantic interoperability assets previously developed at EU level.

*Organizational interoperability*

According to [15], organizational interoperability

> *"is concerned with the coordination and alignment of business processes and information architectures that span both intra- and interorganizational boundaries… Coordination of business processes across organizational boundaries is essential if a single, aggregated view of a service from the customers' perspective is to be achieved."*

Another explanation is found in [40]:

> *"Organizational interoperability, as the name implies, is the ability of organizations 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. Organizational interoperability depends on successful technical, syntactical and semantic interoperability."*

Organisational interoperability arises from differences in business processes and internal structures of organisations which are involved in establishment and provision of public services and need to collaborate towards mutually beneficial and agreed European public service-related goals [30]. Therefore, the aim of achieving organisational interoperability is to overcome all organisational obstacles, thus being able to set up the relevant intra- and inter-organisational workflows [18]. In practice, organizational interoperability implies integrating business processes and related data exchange. Organisational interoperability also aims to meet the requirements of the user community by making services available, easily identifiable, accessible, and user-focused [19].

Achieving organisational interoperability is related to the following activities [19, 33]:

- identification of the players and organisational processes involved in the delivery of a specific service;
- full examination of their organizational processes, procedures, and structures to determine better ways of doing business and to identify and address/remove any possible barriers. It includes alignment of existent business processes of different administrative entities or definition and establishment of new ones for efficient and effective interaction. Aligning business processes

implies documenting them, in an agreed way, so that all PAs contributing to the delivery of European public services can understand the overall business process and their role in it;

- achieving agreement between administrative entities how to structure their interactions. This involves finding instruments to formalise mutual assistance, joint action and interconnected business processes in connection with cross-border service provision. Examples of such instruments are MoUs on joint actions and cooperation and/or Service Level Agreements (SLAs) signed between participating PAs. For cross-border action, they should preferably be multilateral agreements;
- integrating business processes and related data exchange;
- change management to ensure the accuracy, reliability, and continuity of the service delivered to other PAs, businesses, and citizens.

*Technical interoperability*

According to [18], technical interoperability is concerned with all technical issues (technologies, standards, policies) to guarantee that the technical components of the information systems of the collaborating authorities will be able to work together. Therefore, technical interoperability covers the technical aspects of linking information systems [19]. It should be noted that technical interoperability is concerned not only with technologies at the physical connection layer (such as network protocols), but also with technologies that support the organisational and the semantic layers [18]. It includes aspects such as interface specifications, interconnection services, data integration services, data presentation and exchange, etc. Therefore, technical interoperability should be ensured, whenever possible, via the use of formalized specifications [19]. According to [39] formalised specification is either a standard pursuant to Directive 98/34/EC (technical specifications approved by a recognised standardization body can be called a standard) or a specification established by ICT fora and consortia.

*Key factors*

In [18], key factors corresponding to each interoperability level described previously are identified. They should be considered when designing and implementing relevant projects. Moreover, the key factors can be perceived either as critical success factors for reaching an advanced level of interoperable systems or as barriers (e.g. when identified as missing elements). The factors are summarized in Table 5.5. However, some notes must be taken into account:

- the following distinction is made between two technical interoperability fields:
  - core technical interoperability covers all technical issues that are related to and support the very notion of interoperability, that is, data, information and meaning exchange and/or seamless distributed process execution (e.g. understanding the data syntax and/or semantics) amongst different information systems and organisations. In this category, development and usage of the following technologies are considered as key factors:
    - data schemas and definitions;
    - SOAs and workflows;
    - Semantic Web;
    - Semantic Web Services.

    These technologies are organized in a matrix structure (Table 5.6), where:
    - the vertical axis presents the type of integration problem which is considered: a) "structure" refers to issues related mostly to data definitions, format, properties etc., and b) "semantic" refers to the meaning of data;
    - along the horizontal axis, a common distinction in information systems between information and process/service is used.

Table 5.6

Technologies considered as key factors for core technical interoperability (adopted from [18])

| | **Information/Static** | **Process-Service/Dynamic** |
|---|---|---|
| **Structure** | Data schemas and definitions (e.g. XML, Data models, OO models) | SOAs, Workflows (e.g. Web Services, BPL) |
| **Semantic** | Semantic Web (e.g. RDF, ontologies) | Semantic Web Services (e.g. OWL-S, WSMO) |

Therefore, combinations of values of both axes represent a field of relevant technologies that are considered as key technical interoperability factors.

- supportive technical interoperability covers broader technical issues that do not directly affect this central interoperability function and that although are common in almost all information systems implementations, become more challenging and difficult to handle in environments where interoperation is required (e.g. availability).

Table 5.5

Key factors of interoperability at different levels [18]

| Key factor | Explanation |
|---|---|
| **Technical Interoperability Key Factors** | |
| *Core Technical Interoperability* | |
| Structure/Information Technologies | XML, Databases |
| Structure/Service Technologies | Web Services, SOA, WSDL, UDDI, Workflows |
| Semantic/Information Technologies | RDF, DAML +OIL, OWL |
| Semantic/Service Technologies | OWL-S and WSMO, Semantic Web Services |
| *Supportive Technical Interoperability* | |
| Accessibility | The front-end of an eGovernment application/system must satisfy user needs regarding usability and accessibility (easy access to information and services) |
| Multilingualism and multiplatform devices | eGovernment applications/systems should be multilingual and should support multiplicity of interface devices |
| Security and Privacy | Data confidentiality and security mechanisms are considered as important aspects that need to be addressed in a technical interoperability dimension |
| Subsidiarity | The front-end should be able to provide different functionalities, modules, and options according to user rights belonging to different user categories |
| Open Source Software | OSS is software that its source code is available to the general public for use and/or for modification. This public view over the code provides a sound basis for creating interoperable applications. However, the use of OSS does not automatically signify that an application adheres to open standards. Two OSS applications can interoperate only when they both adhere to the same open standard |
| Open Standards | Standards play a key role in enabling technical interoperability. Government policies that support the implementation or adoption of open standards improve technical interoperability and benefit governments as a whole |

Table 5.5 (continued)

Key factors of interoperability at different levels [18]

| Key factor | Explanation |
|---|---|
| **Semantic Interoperability Key Factors** | |
| *With regard to drafting/agreeing on the common definitions/vocabularies/metadata* | |
| Common and global definitions/representations for eGovernment semantics | In the absence of specific efforts to address eGovernment specific and widely adopted data definitions and vocabularies, government entities at all levels are being left to adopt the semantics and vocabularies developed for private industry for cross-industry applications or – even worse – creating local, non-standard vocabularies. Governments need to examine and analyse the various data vocabularies being standardised and decide which of these vocabulary efforts could form the basis for a solution that specifically addresses the requirements of eGovernment. Although this approach promises a quick start in semantic interoperability work, it has certain limitations. At one point or another, work must be done to define and agree upon government sector-specific semantics. The vocabulary for expressing governmental functions and processes contains a number of elements that are unique to government. Agreement is required on the context and precise meaning of this vocabulary, as it will provide the basis for defining all exchanged data. This agreement is expected to be more effectively reached by communities of practice that define requirements and develop the necessary standards and policies for semantic interoperability in their own domain. These communities of practice should be promoted and encouraged to develop their own consensus and the latter can then serve as the basis of the standardisation of their domains |
| Modelling perspective and formalism for documenting the common definitions | The issue of choosing the right modelling perspective is critical and is inevitably linked with the modelling formalism and languages that will be used to create the needed representations. PA personnel need to understand the data standards before consensus can be reached. A complete data model with information on all levels in order to understand both technical and business-related issues provides this foundation. In this line, special consideration should be taken to ensure that the proposed data representation is simple, extensible, in line with a centrally defined modelling perspective and “user-friendly” |
| Administrative level of definitions development | In theory, there are two approaches for developing eGovernment interoperability standards:<br>• top-down: standards imposed by a central mechanism to all PA sector organisations;<br>• bottom-up: standards are evolved from the day-to-day operational collaboration of agencies, first, at sectoral and then at national/federal level.<br>In practice, both approaches are needed when agreeing on these definitions |
| *With regard to using/exploiting common definitions* | |
| Promotion/dissemination and maturity of common definitions | The data standard must be made visible in order to facilitate the standardisation process. Moreover, maturity of standards is also discussed as a key factor in a long-term national standardisation initiative |

Table 5.5 (continued)

Key factors of interoperability at different levels [18]

| Key factor | Explanation |
|---|---|
| Trust, reliability and the supportive technical interoperability layer | In order for services to thrive and grow in an interoperability enabling infrastructure, trust of each service is essential. Recognising this fact and also charting the details and characteristics of such a trust is an important step in the whole process. Mere syntactic and semantic standardisation is not enough; the level of quality, documentation, security and reliability offered by a service can really make a difference |
| *With regard to maintaining/evolving common definitions* | |
| Maintenance and evolution of common definitions | Maintaining and evolving these definitions within a government-wide distributed group of people and organisations is a challenging task – even more as currently there are almost no tools mature enough and readily available to support this demanding maintenance process. Several threats exist. For example, data, applications and definitions that conform to an agreed schema (a) might become inaccessible, unusable, or inconsistent after certain changes occur, and/or (b) might demand a huge effort as managing different versions and branches of such schemas shortly becomes a highly laborious, knowledge-intensive and hardly manageable task |
| **Organizational Interoperability Key Factors** | |
| Clear link between cross-organisational processes/services and the business strategies of the broader agencies | In a PA environment, this means that the design and execution of the full set of public services by each separate agency and even more importantly the set of the new services that will derive from collaboration and interoperation among PA agencies should be based on and be compliant with the general strategy and policy of the agencies involved and linked to their broader strategic mission and vision |
| Modelling and visualisation of PA services/processes | The modelling of the different processes involved in the workflow of the administration is being perceived as a crucial factor and it should be the first step prior to the design of new electronic services. Appropriate modelling of services and processes may support the service/process visualisation and vice versa. Process diagrams visualising the integration of systems should be structured through a series of views. These series of views should start with a customer oriented view, or some other actor's view, presenting the business level and add more and more details moving from a business perspective to a more technical perspective. Among other things, process modelling and visualisation serve as vital preconditions to service monitoring. Both the explicit description of an electronic service (modelling), and the ability to monitor its current execution state bring very valuable visibility and transparency to the entire system |
| Involvement of the users by setting up communities of practice in the process of new service design | Organisational interoperability is "user-centric" in nature and requires the active involvement of the users in question (in this case, governments, PA agencies and citizens/businesses). To ensure this customer-centric approach to service provision and to improve the efficacy of the public service, public organisations need to use their constituents to evaluate their internal processes, procedures, and structures |

Table 5.5 (continued)

Key factors of interoperability at different levels [18]

| Key factor | Explanation |
|---|---|
| Reuse of knowledge and experience related to the execution of internal and cross-agency business processes/services from the private sector | PA agencies can easily reuse the experiences and models that have been successfully implemented in the private sector. To this end, e-business models developed in the enterprise sector should be assessed. Their use by PA should also be encouraged where appropriate. Public organisation could try to learn from these experiences and transfer knowledge to their own cross-agency and constituent relationships |
| Identification and documentation of common service functionality and features across PA agencies | An organisational interoperability programme needs to address possible common functionality across services and develop means for providing this identified common functionality. This common service layer is usually called Shared Service Layer and/or Auxiliary Services and includes infrastructure services such as authentication, e-payment, security, digital signature, electronic IDs, etc. In addition to such technical infrastructure, under this factor one can also include artefacts such as a common PA service model. Instead of having each PA organisation develop its own infrastructure to support this type of functionalities, a centralized approach seems to be highly preferable as it creates economies of scale, provides common solutions for overall PA and releases resources to be used effectively at the local level |
| Support of multi-channel service delivery | This requirement calls for a loosely coupled back vis-à-vis front office systems to allow the delivery of services through different and alternative channels |
| Consensus on and visibility of the ownership, management and responsibility of cross-organisational processes/services | At any time, all actors participating in an electronic service (e.g. civil servants, citizens) should be able to know what is the status of the electronic service, in other words, who is responsible for its prior, present and next step(s). It seems that in most cases a central ownership of the overall service execution should be maintained by a single organisation, most probably the actual service provider |
| **Key Factors for Interoperability Governance** | |
| *Political* | |
| Development of national eGovernment interoperability strategy and programmes | eGovernment interoperability is very difficult to take off unless supported by a central strategy, plan, and support at a national/federal level |

Table 5.5 (continued)

Key factors of interoperability at different levels [18]

| Key factor | Explanation |
|---|---|
| Promotion of organisational federalism as a model for organising the divergent administrative space into a cooperative environment | Federalism is a structural and organisational model by which basically independent, autonomous entities join forces to form a higher-level whole in order to combine a required level of uniformity with the kind of diversity that is indispensable if the organisation wants to be successful. In federations, the specific integration requirements should emerge through the representation of the inter-networked organisation and not on the basis of the individual participant. Unfortunately, for PA agencies such a cooperative environment could be erroneously perceived as a loss of control by agencies over decisions relating to their business. Operating in a federated environment poses specific requirements for all participating actors. The following two are of particular interest in the eGovernment domain:<br>• dynamism of the system, regarding the fact that parties are allowed joining and leaving the networked organisation (federation) at any moment;<br>• organisational autonomy, in that each organisation is responsible for its own information resource management and representation. |
| Significance of international interoperability aspects | eGovernment interoperability is not just a country-specific or national issue, but it is global in scope. The international aspects become of particular importance in the case of EU countries. In this setting, the interoperability discussion should be organized and accommodated to the European level, as it requires an enhanced cooperation between EU and MSs with respect to national and regional initiatives. Moreover, it requires the cooperation of European PAs with international standardisation initiatives and research activities |
| *Legal* | |
| Legal alignment to address the new requirements posed by intensive cooperation of PA agencies | Even at a lower scale, quite often for promoting eGovernment interoperability an alignment of laws, regulations etc. is required |
| Protection of intellectual properties in multi-partners projects and developments | Government should leverage and be protective of the intellectual property that the ICT industry develops. Governments should act proactively to avoid conflicts in the near future |
| Diffusion of digital signature and electronic identity | It is identified as the main factor that allows the usage of the system to grow |
| Citizen privacy and data protection | The sharing and exchange of information raises important data protection and privacy issues. These must be suitably addressed if eGovernment services based on information sharing, aggregation, and interoperability are to gain wide acceptance and usage |

Table 5.5 (continued)

Key factors of interoperability at different levels [18]

| Key factor | Explanation |
|---|---|
| *Managerial* | |
| Clear interoperability leadership/ ownership/sponsorship/management | This is related with development of a structured organisational model for interoperability management. Within this model, agencies need to be identified to take responsibility of the different facets of interoperability. Therefore, each MS will need to individually identify which of its agencies would be the most appropriate governing authority for each element of the interoperability strategy and architecture. On a lower per project base, project sponsorship at a high level and clear ownership of developments are considered a warrantor for success |
| Flexibility/ transferability/ reconfigurability of the interoperability solutions | Interoperability solutions should be as transferable as possible to avoid overspending of resources in order to solve local problems or solve the same problem more than once. More generally, the need for flexibility of interoperability solutions has at least two aspects:<br>• as interoperability always concerns a group of organisations, a flexible system is needed both to accommodate the particular unique characteristics of each separate organisation of the group and ensure that new organisations could easily enter the system with minimum additional effort;<br>• as transferability is highly desirable in interoperability solutions, the system should be easy to be reconfigured for different needs. |
| Adoption of any relevant available standard and proposal of new standards in areas where standardisation is missing | Government, through its procurement, research, and policies, should support and encourage the efforts to develop, adopt, and promote open standards. Open standards compatibility should become a major software selection criterion for governments to ensure its interoperability. Moreover, governmental officials responsible for implementing eGovernment should participate in the standards-setting process as technology end-users stating business requirements, ensuring that government-specific requirements and national viewpoints are embodied in technical standards (e.g. privacy requirements and security standards) |
| Broad commitment, participation and communication | The identification and involvement of the stakeholders in drafting and implementing an interoperability strategy is critical. Intergovernmental collaboration depends on stakeholder communication, and involvement as well as on awareness as to how each stakeholder benefits from this collaboration |
| Willingness for cultural change at all partners | There must be the explicit will of all actors to change the system and procedures even if the owner organisation has to accept some disadvantages on the way to the overall objective |
| Staff training related to interoperability projects | Staff training is usually perceived as a prerequisite for the actual use of the new interoperable systems. Training is also seen as a means to achieve commitment, participation, communication and cultural change, thus it is closely linked and facilitates the two previous key factors |

Table 5.5 (continued)

Key factors of interoperability at different levels [18]

| Key factor | Explanation |
|---|---|
| *Economic* | |
| Adoption/switching costs inherent to interoperability solutions | An important issue that should be taken into account is related to the high adoption costs that may result from adopting cutting edge interoperability technological solutions and systems |
| Public procurement policies and financing for interoperability projects | Public procurement policies that promote interoperability should be developed, as these are currently not in place. A central policy of support could ensure that financial priority is given to those initiatives that comply with and adhere to the principles of eGovernment interoperability. To this end, a central funding programme to allow agencies to develop the necessary infrastructure required to support interoperability could be made available and financial incentives to encourage intergovernmental collaboration and sharing of information should be put in place. Another issue related to the procurement and financing policies is linked to the higher risks and costs that exist for pioneering organisations when trying to develop an innovative interoperability solution. It is an issue for the central interoperability strategy to take some measures to reduce the extra costs and resistance that pioneers in the field of eGovernment interoperability may have to deal with |
| Partnering with the private sector in interoperability projects | The public sector partnering with the private sector, in particular the ICT industry is considered also a crucial success factor. Without partnering with the private sector, eGovernment interoperability runs several risks such as:<br>• adopting technologies and standards that become outdated and unsupported over time;<br>• not being able to rapidly take advantage of technology advances and business process improvements that private industry develops. |

- key factors of semantic Interoperability are grouped with regard to the lifecycle of common definitions development, that is:
  1. drafting/agreeing on the common definitions/vocabularies/metadata, etc.;
  2. using/exploiting these common definitions;
  3. maintaining/evolving common definitions.
- key factors for interoperability governance group factors in a broader political, legal, managerial, and financial sense and consider them along two dimensions (Table 5.7):
  - first dimension includes four types of key factors:
    - political factors are related to broader policy and institutional issues and should be addressed by political personnel;
    - legal factors need legal action;
    - managerial factors pertain to organisational, managerial, and technology related (e.g. decisions on technologies to be used) issues and should be dealt with by PA professionals and managers;
    - economic factors are related to financing and budgeting.
  - the second dimension identifies three levels where action should be taken:
    1. EU level: aspects that should be addressed at the EU level;
    2. national level: aspects that should be addressed at the national level;
    3. agency level: aspects that should be addressed at the agency level.

Interoperability agreements

As stated in [19], providing European public services requires cooperation among different PAs at the different interoperability levels described previously. For each level (legal, organizational, semantic, technical) the organizations involved should formalize cooperation arrangements in interoperability agreements which should be drafted with sufficient detail to achieve their aim — to provide a European public service — while leaving each organization maximum internal autonomy. Table 5.8 explains interoperability agreements at each level of interoperability.

A number of equivalent, competing specifications may be available at technical or semantic level as a basis for interoperability agreements. From one side, PAs may decide to support multiple formalized

specifications or technologies to communicate with citizens and businesses. However, from another side, taking into account efficiency, it would be rational to reduce, as much as possible, the number of them when working together to provide a European public service [19].

Table 5.7

Matrix of key factors related to interoperability governance (adopted from [18])

| | Political | Legal | Managerial | Economic |
|---|---|---|---|---|
| **EU** | e.g. EU Council, EU Parliament | e.g. EU Directives | e.g. EC | e.g. EU Programmes |
| **National** | e.g. Ministers | e.g. National Legislation | e.g. Central eGovernment Units | e.g. NIFs and programmes |
| **Agency** | e.g. Political Appointees | Not applicable | PA professionals | e.g. Agency Funding |

Decisions concerning usage of formalized specifications and technologies should be based on transparency, fairness, and non-discrimination. One way to do this is to agree on a common assessment methodology and selection process taking into account [19]:

- assessing and selecting formalized specifications:
  - when PAs select the formalized specifications or technologies to ensure interoperability, they should assess relevant formalized specifications;
  - this assessment should be tailored to the specific interoperability needs of the PAs in question, but based on objective criteria, primarily related to functional interoperability needs;
  - when several formalized specifications meet functional interoperability needs, additional criteria on quality of implementation, market support, potential for reusability and openness can be used.
- specifications, openness, and reuse. The level of openness of a formalized specification is an important element in determining the possibility of sharing and reusing software components implementing that specification. This also applies when such components are used for the establishment of new European public services. If the openness principle is applied in full:
  - all stakeholders have the same possibility of contributing to the development of the specification and public review is part of the decision-making process;

- the specification is available for everybody to study;
- intellectual property rights related to the specification are licensed on FRAND (fair, reasonable, and non-discriminatory terms, a licensing obligation) terms or on a royalty-free basis in a way that allows implementation in both proprietary and OSS.

However, PAs may decide to use less open specifications, if open specifications do not exist or do not meet functional interoperability needs. In all cases, specifications should be mature and sufficiently supported by the market, except if used in the context of creating innovative solutions;

- contribution to the standardization process. In some cases, PAs may find that no suitable formalized specification is available for a specific need in a specific area. If new specifications have to be developed, PAs may either develop the specifications themselves and put forward the result for standardization, or request a new formalized specification to be developed by standards developing organizations.

Table 5.8

Interoperability agreements

| Level | Explanation | Specificity |
|---|---|---|
| Legal | Interoperability agreements are rendered specific and binding via legislation, including European directives and their transposition into national legislation, or bilateral and multilateral agreements, which are outside the scope of the EIF | Specific to the European public service concerned |
| Organizational | Interoperability agreements can, for example, take the form of MoU or SLA that specify the obligations of each party participating in cross-border business processes, and will define expected levels of service, support/escalation procedures, contact details, etc., referring, when necessary, to underlying agreements at semantic and technical levels | |
| Semantic | Interoperability agreements can take the form of reference taxonomies, schemes, code lists, data dictionaries, sector-based libraries, etc. | Can often be mapped onto existing formalized specifications (at semantic level, to a lesser extent) |
| Technical | Interoperability agreements include interface specifications, communication protocols, messaging specifications, data formats, security specifications or dynamic registration and service discovery specifications | |

The main aspects of interoperability agreements are displayed in Figure 5.5.

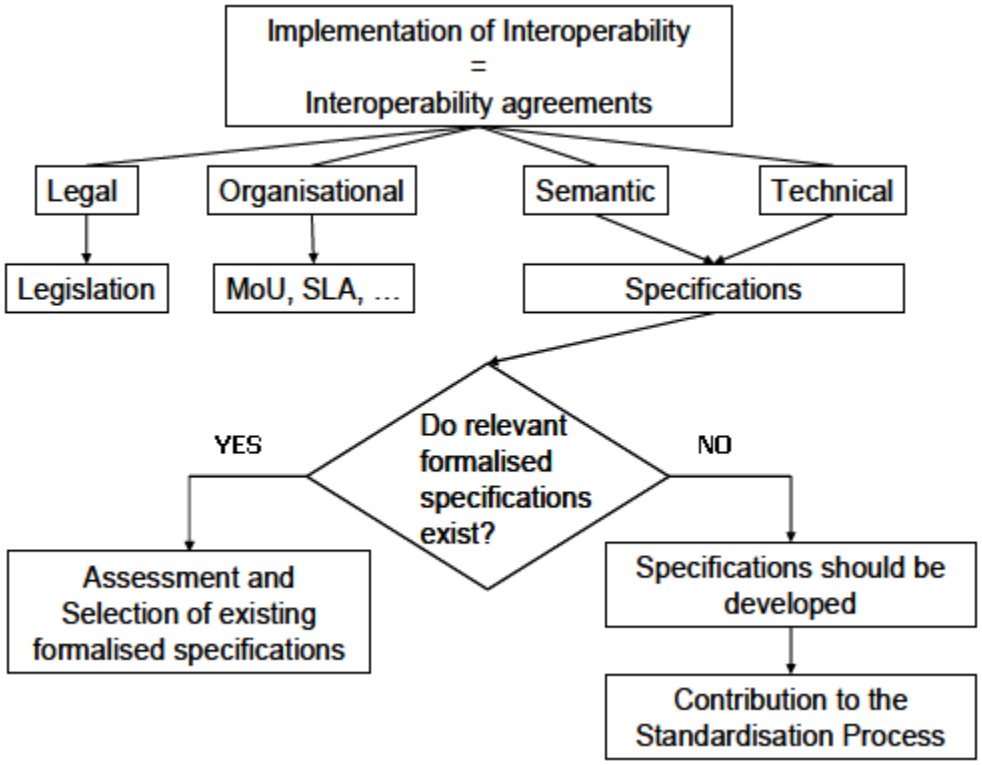



Figure 5.5. Aspects of interoperability agreements (adopted from [41])

Interoperability governance

According to [19], ensuring interoperability between legal instruments, organization business processes, information exchanges, services, and components that support the delivery of a European public service is a continuous task, as interoperability is disrupted by changes to the environment, i.e. to legislation, the needs of businesses or citizens, the organization of PAs, business processes, or technologies.

Even if interoperability is maintained for a given European public service, its delivery often relies on components that are common to many European public services. These components, which are the results of interoperability agreements reached outside the scope of the European public service, should also be made available over time [19].

Moreover, as the common components and interoperability agreements are the results of work carried out by PAs at different levels (local, regional, national, EU), coordination and monitoring this work requires a holistic approach [19].

In the light of a number of existent political initiatives at the European level, there cab be confusion in understanding their scope, goal, nature, and context. Table 5.9 displays main difference between the Digital Agenda for Europe (see section 3), the ISA Work Programme (see Section 6.2), the European eGovernment Action Plan, the EIS, and the EIF.

Table 5.9

Difference between recent European initiatives (adopted from [42])

| Aspect | The Digital Agenda for Europe | The European eGovernment Action Plan | The ISA Work Programme | The EIS | The EIF |
|---|---|---|---|---|---|
| Scope | ICT measures to bring the European Digital Single Market for every European based on fast and ultra-fast Internet and interoperable applications | Provision of a new generation of eGovernment services for businesses and citizens | Interoperability solutions for European PAs | Setting objectives to achieve the policy goal (increase of interoperability)<br><br>Providing direction and setting priorities to address interoperability problems that currently hamper cooperation among European PAs | Requirements for information system design in a way that allows PAs to interact<br><br>Promoting and supporting the delivery of European public services by fostering cross-border and cross-sectoral interoperability; supporting PAs in their work to provide European public services to businesses and citizens |
| Goal | Helping every European to go digital by providing and promoting the necessary 21st century technologies and online services | Improving the conditions for development of cross-border eGovernment services provided to citizens and business regardless of their country of origin | Enabling smooth and seamless exchange of cross-border digital information exchange between PAs and fostering the reuse and sharing of existing ICT solutions | Providing an organizational, financial and operational framework to support cross-border and cross-sectoral interoperability related activities | Specifying common interoperability elements such as vocabulary, concepts, principles, policies, guidelines, recommendations, standards, specifications, and practices to European PAs |

Table 5.9

Difference between recent European initiatives (adopted from [42])

| Aspect | The Digital Agenda for Europe | The European eGovernment Action Plan | The ISA Work Programme | The EIS | The EIF |
|---|---|---|---|---|---|
| Nature | Policy Strategy | Citizens and Business centric action plan | Administration centric support programme | Policy Strategy | Policy Framework |
| Legal Basis | Communication from the EC | Communication from the EC | Decision of the European Parliament and of the Council | Part of the European Commission communication on interoperability | Part of the European Commission communication on interoperability |
| Context | One of the 7 flagship initiatives of the Europe 2020 strategy (see Section 3) | The Malmö Ministerial Declaration and the Granada Ministerial Declaration (see Section 4) | Contributing to the:<br>• Digital Agenda<br>• eGovernment action plan<br><br>Implementing the:<br>• EIS<br><br>Applying the:<br>• EIF | Contributing to the:<br>• Digital Agenda<br>• eGovernment action plan<br><br>Implemented through actions launched under the ISA programme (see Section 6.2), the CIP ICT-PSP programme(see Section 6.3) and the eGovernment action plan | Contributing to the:<br>• Digital Agenda<br>• eGovernment action plan |
| Time Frame | Since 2010 | 2011-2015 | 2010-2015 | 2010 - 2015 | 2010 |
| Beneficiaries | All European citizens, businesses and PAs | European business and citizens | European PAs (indirectly also businesses and citizens) | European PAs (indirectly also businesses and citizens) | European PAs (indirectly also businesses and citizens) |

## 5.3. NATIONAL INTEROPERABILITY FRAMEWORKS

In parallel with development of the EIF (see Section 5.2), the MSs develop their NIFs. By their nature, NIFs are, in general, more detailed and often prescriptive than the EIF (see Section 5.2), which operates at a higher level of abstraction, as a 'meta framework' and, in line with the subsidiarity principle, does not impose specific choices or obligations on the MSs [19]. The EIF (see Section 5.2) and the NIFs are complementary and must be aligned.

The EC supports a NIFO, whose main objective is to provide information about the NIFs to allow PAs to share experiences and knowledge [19]. It focuses on the analysis of the NIFs based on a model that allows the comparison of various aspects. This model aims to highlight similar characteristics of the NIFs and does not serve as a benchmarking tool. The NIFO was launched in 2008 under the IDABC programme (see Section 6.1), where the analytical model was developed based on analysis of the Maltese, German and Danish NIFs. The second phase of the NIFO saw the extension of this analysis to 33 countries, including all EU MSs, European Economic Area and EU Candidate Countries [37].

According to [43], in 2012, NIFO has published 29 factsheets presenting current status of NIFs. The conclusion is that 17 out of 29 European countries have national guidelines on interoperability, nine of them are well-aligned to the EIF. At the same time, 12 countries do not yet have a policy or a guideline on interoperability. Factsheets are available at https://joinup.ec.europa.eu/elibrary/factsheet/national-interoperability-framework-observatory-nifo-factsheets.

In the framework of the current ISA programme (see Section 6.2) the action related to NIFO started in 2011 and will continue till 2015. Its objectives are [37]:

- revising the comparative model to take into account the new EIF (see Section 5.2) and the Digital Agenda (see Section 3);
- providing support to EU PAs to align their NIFs with the EIF (see Section 5.2);
- setting up a new maintenance process to provide the most up-to-date information possible;
- analyzing the current national interoperability activities using the updated model and updating the respective factsheets with the results.

The benefits of the action are the following [37]:

- providing guidance and support both for the development of new NIFs and the alignment of current interoperability initiatives to the EIF;
- providing input to decision-making processes regarding national developments, and giving national policy officials an objective overview of the European situation and the position of their MS;
- providing a better insight into the status of NIF developments across Europe, benefiting commercial enterprises that are involved in the realization of eGovernment solutions, such as service integrators and software vendors.

### 5.4. INTEROPERABILITY ARCHITECTURE

It is necessary to note that at the moment an approved European-level interoperability architecture does not exist. In past, results of several other efforts are related to interoperability architecture:

- "Key Principles of an Interoperability Architecture" (2004) developed by eGovernment Working Group of European Public Administration Network [15]. The report considers the main layers of interoperability and suggests possible approaches that could be taken at each of these layers in the implementation of a national interoperability architecture. Principle, rationale, possible implementation approach, benefits, and drawbacks of the suggested approaches are described in detail.
- "Architecture Guidelines" (2004) [44] describing an architecture agreed upon by the IDA programme (see Section 6.1). It enables trans-European networks to interoperate, and thus allows PAs in Europe to interchange data. The Architecture Guidelines are designed to support the interoperability decision goals, by providing:
  - architectural principles to ensure a coherent, generic services-based approach to developing trans-European telematics networks;
  - guidance on how to use generic services and common tools as soon as these are made available by the IDA and IDABC programmes (see Section 6.1) to the EU user community.

  The guidelines describe user requirements, implementation principles, and approaches, as well as provides roadmap from requirements to application implementation.

One of the significant studies is the study “European Interoperable Infrastructure Services - EIIS” (2009) [45] which was developed in the framework of the IDABC programme (see Section 6.1). The main objective of the study was to identify and describe common interoperability infrastructure services to support European public services. In that perspective, the study has selected components in existing systems or systems in development that were best positioned to be part of the solution that could deliver these EIIS. The study has also proposed implementation options for the EIIS and defined nine EIIS:

- Audit trail and log chronologically records information about the usage of European public services. It collects data to examine how and when events occurred, who accessed a system and what actions he or she performed during a given period of time. The logged information can be the exchanged information between the system and the users of the system (incoming and outgoing messages), the log-on data, the transaction content and properties-time, checks and other actions performed by the users as well as actions performed by system administrators, or automated actions initiated by the system. Audit trail and log records data generated by system processes and which do not correspond to specific user actions and actions taken by identifiable and authenticated users.
- Service registries are central registries that provide a description of available services. The registry presents for each service how to use them, their current status, and their physical locations. A service registry maintains the catalogue of available services in a service-oriented context. Service producers publish services and register them into the registry such that consumers are able to find them. An enterprise may have one or more service registries that can be merged to one enterprise service registry, which is called a federated service registry.
- Identity and access management encapsulates all the processes, policies, and technology solutions that manage digital identities and specifies how digital identities are used to access resources. This infrastructure service includes entity authentication (the mechanism needed to manage controlled access of entities to applications) and authorization (the mechanism to define what access privileges an entity has within the application by defining roles and groups). Note that data authentication, which verifies origin and integrity of data, is not part of this "identity and access management" infrastructure service, as this is treated in the "data certification" infrastructure service.

- Data certification is defined as the process of signing an electronic information (which could also be an e-mail, a file, or a data source), and of verifying whether the origin and integrity of information are what they are expected to be based on certificates issued by different Certification Authorities. This infrastructure service includes the creation, validation, and extension of advanced electronic signatures as front-end services in conformity with the requirements of the EC Directive. Validation of certificates and time stamping are back-end services to provide these front-end services, and may optionally offer also a direct client interface.
- Data transport is the exchange of data in a reliable way by providing standardised transport capabilities. This service facilitates communication between systems for collecting and delivering data, and does not store the data centrally. Each system independently handles its own data and, when required, draws data from the database and sends it to another system.
- Data translation facilitates data transfers between systems (using their own data format, data model, and data encoding) and includes semantic translation, syntax translation, and multilingualism capabilities.
- Workflow management orchestrates interactions between workflow participants (human and systems) and provides each participant with the information that is necessary to complete his or her task.
- Document storage is used to store and to manage documents, providing features at each stage of the document life cycle: creation, retrieving, reviewing, versioning, distribution, publishing, archiving, and eventual destruction. This service facilitates collaboration between different contributors to the document life cycle.
- Structured data storage facilitates the exchange of data by providing a simple and structured interface to access data stored in large and complex databases. This service acts as an abstraction layer between the technical data structure of a database and the functional point of view of a standard user. The structured data service removes the need to maintain a schema, while attributes are automatically indexed to provide fast real-time lookup and querying capabilities. This flexibility minimises the performance tuning required as the demands for data increase.

Currently, in the framework of the ISA programme (see Section 6.2) an action „Towards a European Interoperability Architecture - Elaboration of a common vision for a European Interoperability Architecture – EIA" started in 2010 and will finish in 2012 [37]. This action elaborates with the MSs and

the relevant services of the EC this common vision of an interoperability architecture for European public services. This involves outlining its scope, the articulation of the architectural building blocks, and the need for interface standards between such building blocks. The action will also assess the need and the relevance of having common infrastructure services as part of this architecture.

Analysis during the first phase of the EIS (see Section 5.1), found that at the conceptual level, architecture guidelines were missing or inadequate, notably [37]:

- the absence of architectural guidelines for cross-border interoperability building blocks;
- a lack of concrete and reusable interoperability guidelines, rules, and principles on standards, architecture;
- a lack of specifications on how to develop information exchange between ICT systems;
- inadequate implementation guidelines.

Similar shortcomings were found at the operational level, notably the lack of common infrastructures (i.e. an Interoperability Platform or a European Enterprise Service Bus) at EU level for providing generic and standardised services at European level (i.e. eID, eAuthentication, and eAuthorisation). This action will address these shortcomings [37].

The objective of the action is maximising the exchange of information between European PAs for the sake of public service delivery by establishing a EIA. Project phases include [37]:

- preparatory study to establish a common vision (identification of scope, common components, common infrastructure services, and interface standards);
- assessing the state of play of interoperability architecture and experience gained from European sectoral projects and pilots and from national projects;
- reuse of the outcomes of the EIIS;
- define the common interoperability agreements at EU level that can then be used across sectors and across borders when establishing new European public services;
- assessment of the possible impact of such interoperability architecture at EU and national levels;
- designing an EU interoperability architecture (main components and common interfaces);

- reaching agreement on a set of common infrastructure services as part of the overall interoperability architecture to be provided at EU level;
- agreement on common guidelines, specifying in more practical details the architecture (main components and common interfaces) and, if relevant, the common infrastructure services.

At the moment, the latest achievement in the development of the EIA is the study on a common vision for an EIA developed in 2011 [34]. The scope of the study is limited to cross-border and cross-sector interactions between MSs and between MSs and Commission services, dealing with Administration-to-Administration interactions. It is important to stress the difference between the common vision for an EIA, and the EIA itself. The common vision for an EIA consists of the interoperability agreements that should be common on a European level, while the EIA consists of the solution specifications and solution instances that implement the common vision for an EIA. Therefore, the common vision for an EIA is implemented on the meta-level by means of templates for interoperability agreements and by means of a common set of interoperability agreements that are cross-border (i.e. European), cross-sectoral, highly feasible and have a high added value for interoperability. An interoperability agreement consists of one or more interoperability solution specifications, and an interoperability solution specification can be implemented by means of one or more interoperability solution instances.

During the study the gathered needs and requirements for cross-border interoperability are consolidated into a list of interoperability agreements, which is defined as the Reference Interoperability Agreements (RIA). The consolidation was made in two steps. First, sectoral interoperability agreements at European level were consolidated. Next, the sectoral interoperability agreements at European level were again consolidated in common interoperability agreements at European level, based on the identification of common themes in the sectoral interoperability agreements. Therefore, RIA contains agreements that are needed at European level for the setup of cross-border public services in a specific sector, and the corresponding solution specifications that implement these agreements [34].

For the visualization of the common interoperability agreements, an architecture view is provided based on the commonly accepted architecture domains for an enterprise architecture, being Business Architecture, Data Architecture, Application Architecture, and Technology Architecture. In addition to the architecture domains, the architecture view is extended with the governance of an EIA. As shown in

Figure 5.6, the reference interoperability agreements are positioned in one of the architecture domains or in the governance domain based on the specific theme that they address. Also, for each interoperability agreement, an indication is added related to the four interoperability levels (Legal - L, Organizational - O, Semantic - S, and Technical - T) depending on the detailed agreements that are needed or impacted for a specific interoperability agreement. The indications of the interoperability levels depend on the detailed agreements that are needed or impacted for a specific interoperability agreement, for example, the "23. Agreement on the establishment of contact points to govern the technical access" contains legal and organizational aspects [34].

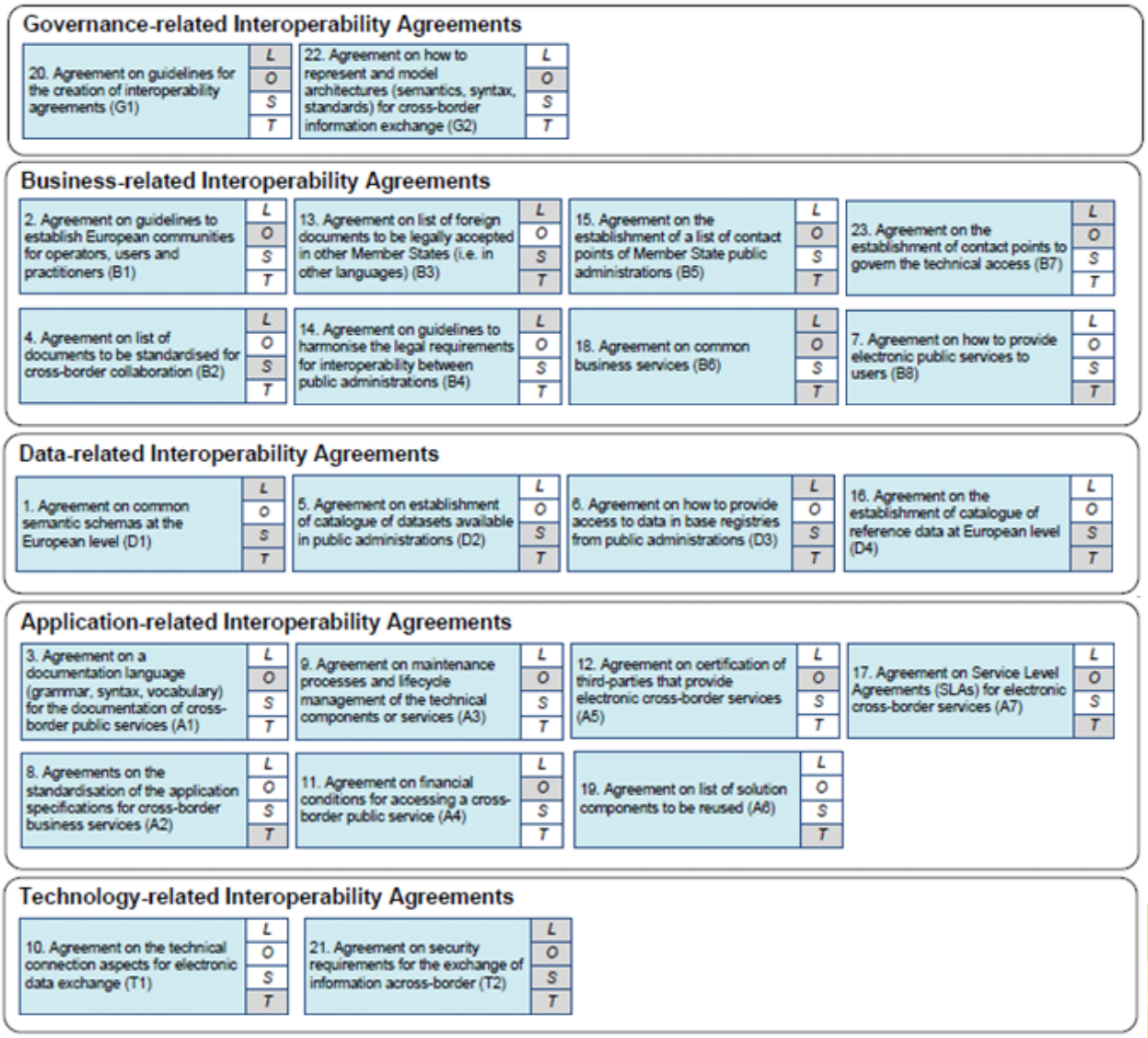



Figure 5.6. Architecture view for interoperability agreements of the RIA (adopted from [34])

Although the RIA defines interoperability agreements at European level, not all of these agreements are applicable across sectors and across borders. Hence, the part of the RIA that is considered common between different sectors and different MSs can be selected into the Common Vision for a EIA [34].

The common vision for an EIA is defined as a common set of interoperability agreements that are cross-border (i.e. European) and cross-sectoral and have a high feasibility and high added value to implement. As shown in Figure 5.7, the selected common interoperability agreements for the common vision for an EIA are similarly to the RIA positioned in one of the architecture domains or in the governance domain [34].

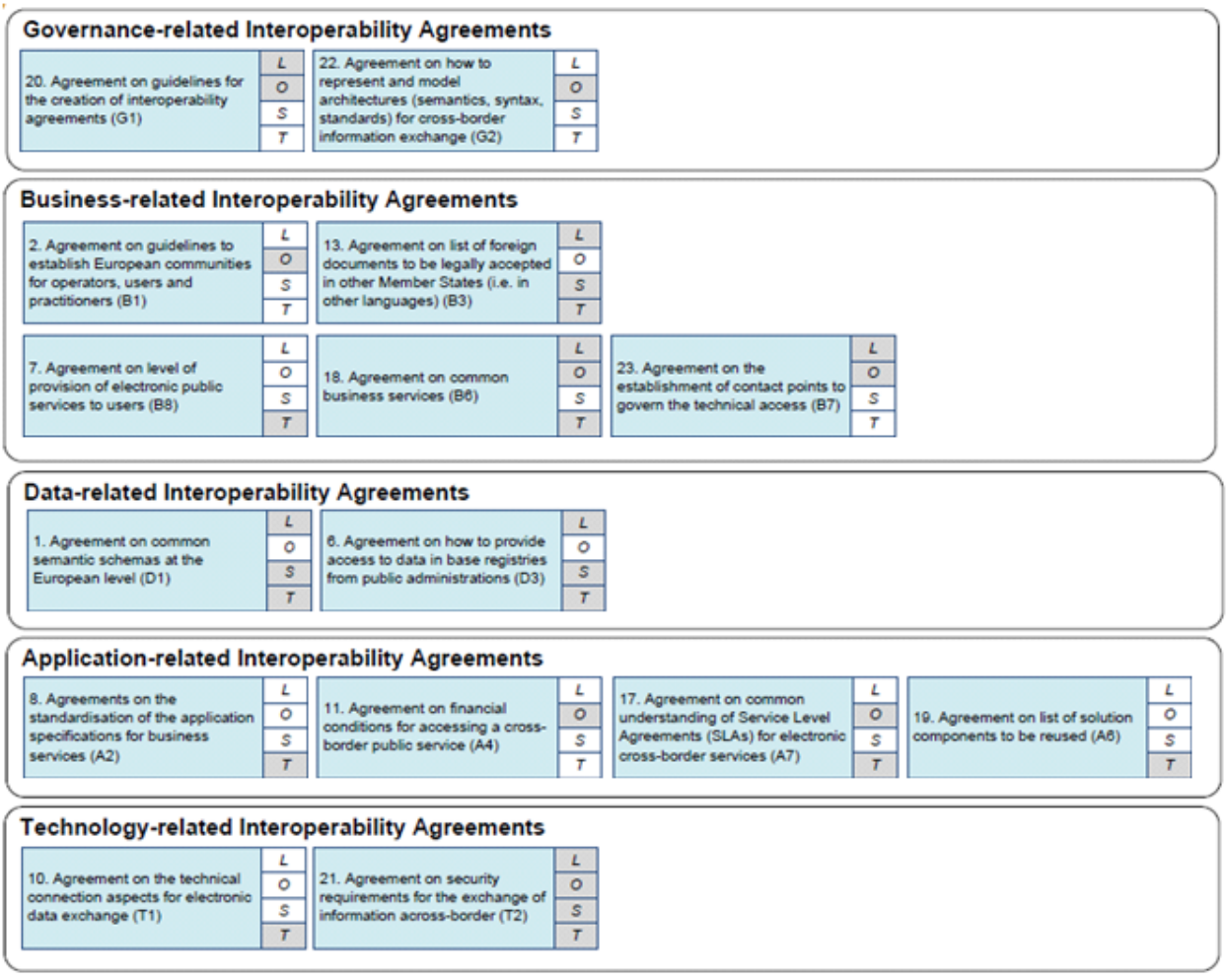



Figure 5.7. Architecture view with selected common interoperability agreements for common vision for an EIA (adopted from [34])

In the framework of the study, the need and relevance of having common infrastructure services as part of an EIA were assessed. A conclusion from the assessment is that there is a definite need for common infrastructure services at national or sectoral level (based on RIA), and at European level (based on EIA). Furthermore, a special need for common infrastructure services to be provided at European level is indicated based on the prioritised interoperability agreements to be implemented for EIA. In this context, the common usage of infrastructure service on a European level can lower the implementation cost of a business service, as different MSs can rely on shared and reusable infrastructure services [34].

The assessment of the need and relevance of common infrastructure services indicated that from nine common infrastructure services identified by the EIIS Study Data Certification and Identity and Access Management are common infrastructure services with the highest need and relevance to be offered on a European level [34]. Assessment of services is provided in Figure 5.8.

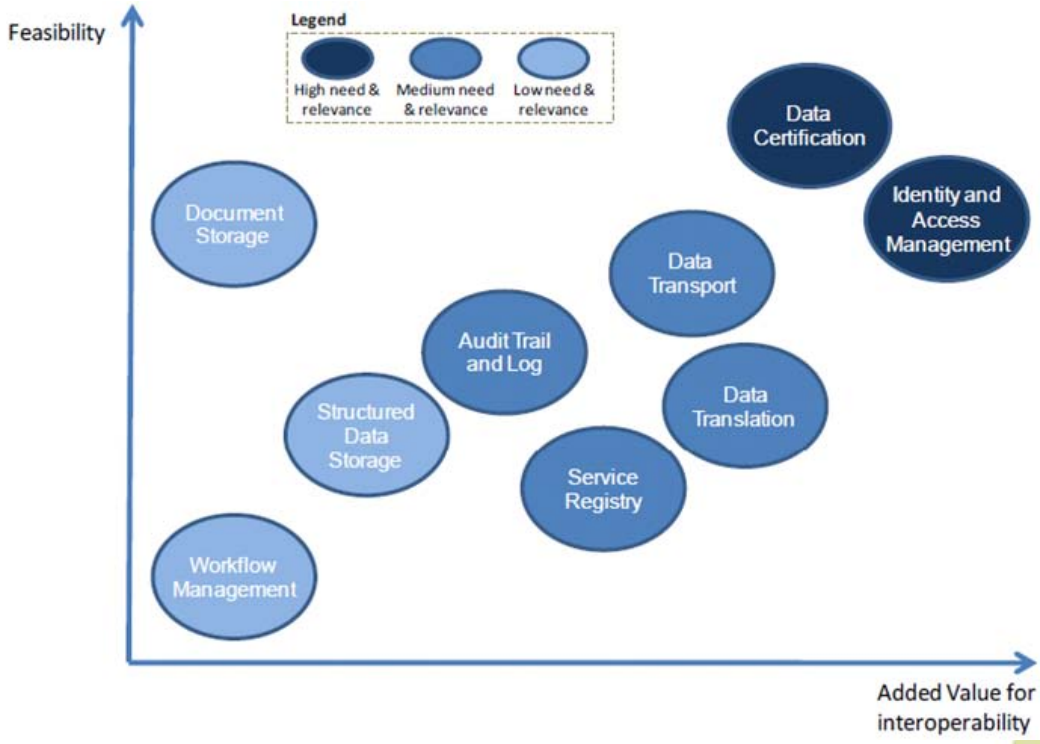



Figure 5.8. Estimations of feasibility and added value of common infrastructure services (adopted from [34])

From the common vision for an EIA, the interoperability agreements were prioritised and concrete and practical solutions were discussed for the implementation of the top priority interoperability agreements. As a result, five actions related to the prioritised interoperability agreements and one transversal action were defined. These actions were identified as key actions to be taken into account for the ISA Programme (see Section 6.2) [34]. As shown in Table 5.10, the solutions to be implemented for the six resulting actions include mostly common frameworks and common services.

Table 5.10

High-level overview for implementation actions (adopted from [34])

| Action | Related to interoperability agreement | Common framework | Common service |
|---|---|---|---|
| Action 1- security requirements for the exchange of information across border | 21 | Common specifications for security requirements of cross-border information exchange | |
| Action 2 – reuse of solution components | 19 | Framework for sharing and reuse of solution components | |
| Action 3 – central platform to publish interoperability assets | | | Central platform to publish interoperability assets |
| Action 4 – implementation of governance for EIA and RIA | 20 | Governance framework for EIA and RIA (including templates for interoperability agreements) | |
| Action 5 - technical connection aspects for electronic data exchange | 10 | Common specifications for technical connection aspects of cross-border data exchange | Common platform for electronic cross-border delivery |
| Action 6 – establishment of contact points to govern the technical access | 23 | Guidelines document on how to establish contact points | |

For each action, an assessment was performed about the effort of implementing the action on the EC and on MSs. The effort is assessed on the four interoperability levels (being legal, organizational, semantic, and technical). Based on the conclusions from the effort assessments, the actions are positioned in a quadrant with the effort on MS and EC as shown in Figure 5.9. For each action, the relative size of the circle provides an indication of the expected effort (i.e. resources, budget, etc.) needed for the implementation of the action [34].

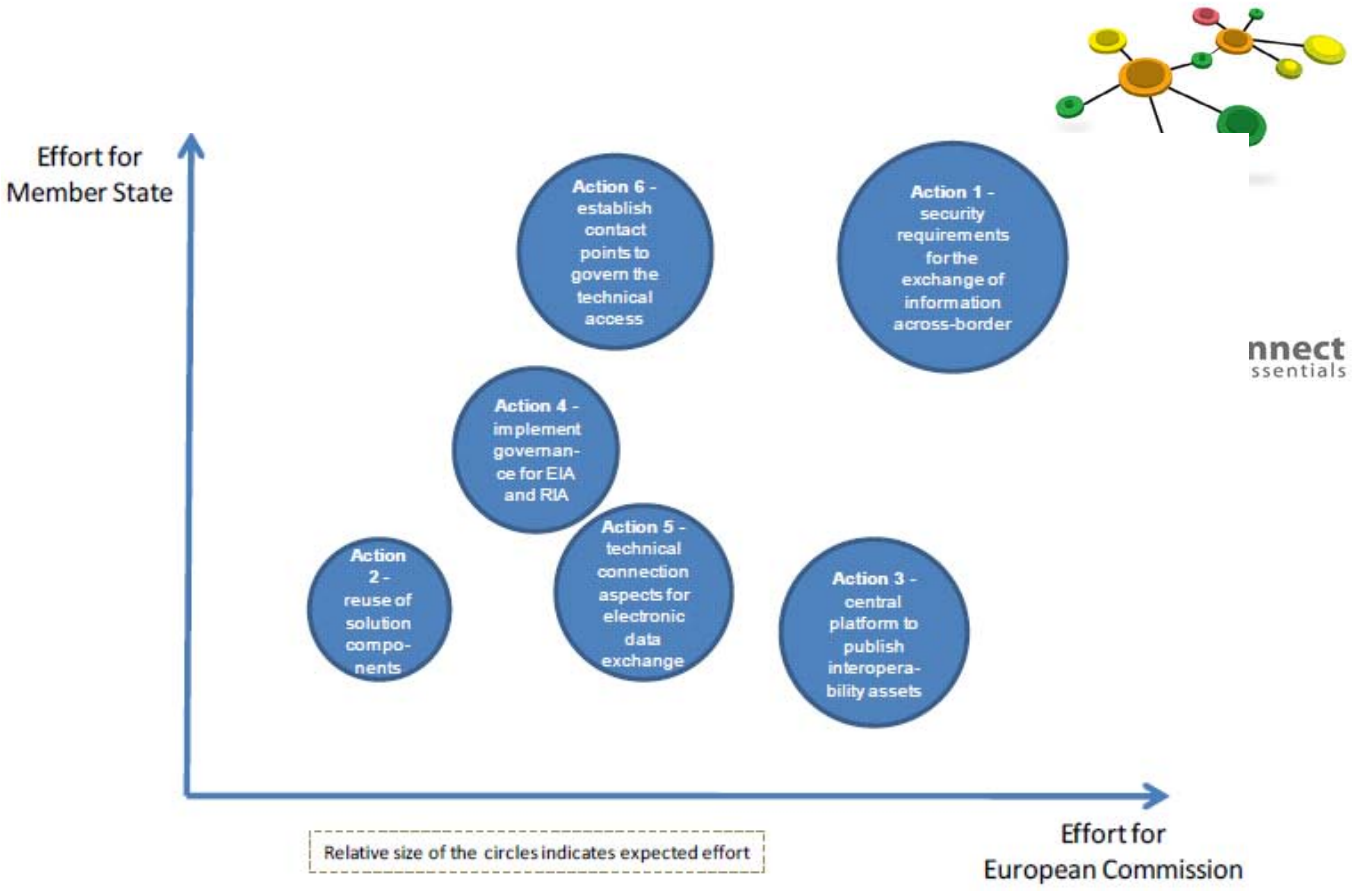



Figure 5.9. Effort assessment of proposed actions for implementation of EIA (adopted from [34])

# 6. EU PROGRAMMES RELEVANT TO INTEROPERABILITY

In the context of interoperability of public services, the following past and current EU programmes are relevant:

- IDA I + IDA II;
- IDABC;
- ISA;
- eTEN + ICT PSP;
- MODINIS.

The programmes IDA (Interchange of Data Between Administrations), IDA II, IDABC (Interoperable Delivery of European eGovernment Services to Public Administrations, Business and Citizens), and ISA (Interoperability Solutions for European Public Administrations) should be considered as a chain of sequent continuous efforts (Table 6.1) directed towards improvement of PA sector in the EU. Similarly, ICT PSP programme (2007-2013) is the successor of eTEN programme (2000-2006).

Table 6.1

Duration of the programmes [38]

| Programme | Duration |
|---|---|
| IDA | 1995-1998 |
| IDA II | 1999-2004 |
| IDABC | 2005-2009 |
| ISA | 2010-2015 |

## 6.1. IDA AND IDABC PROGRAMMES

The IDA and IDABC programmes together have provided a forum for exchange of ideas and experience, and have lent support to the execution of Community policies through sectoral projects leading to the establishment of a wide portfolio of operational trans-European networks and services in traditional policy areas such as agriculture, fisheries, employment, as well as in newer policy areas such as home and justice affairs, communicable diseases, and health and consumer protection. They also provided administrative sectors and MSs with infrastructure services, i.e. frameworks, common services, generic

and complementary tools aiming at achieving interoperability between the back-office administrative systems and processes, as well as between back- and front-office services [28].

According to [38], taking into account eGovernment initiatives existing at that time, the IDA Programme gradually profiled itself as an eGovernment programme. It was focused on 'networks':

- use of IT in PAs and facilitation of transition from paper-based to electronic exchanges across Europe during the first phase (IDA I);
- measures and services to be applied and used to ensure seamless interaction within and across networks at the trans-European level during the second phase (IDA II).

Annual work programmes approved under this programme are available at http://ec.europa.eu/idabc/en/document/2548/3.html

The programme main activities supporting interoperability include the publication of the first version of the EIF, recommendations for promoting open document formats, and an XML Clearinghouse feasibility study [38]. The projects approved under the IDA programme can be found at http://ec.europa.eu/idabc/en/chapter/5926.html

The IDABC programme was established with the Community Decision of 21 April 2004 and launched in January 2005. It was a Community programme managed by the EC's Directorate-General for Informatics, working in close cooperation with the MSs and the different EC's services concerned [38]. IDABC work programmes 2005-2009 are available at http://ec.europa.eu/idabc/en/document/5101/3.html

IDABC contributed to the i2010 initiative (see Section 4) of modernizing the European public sector and played a key role in reaching the eEurope 2005 (see Section 4) objectives, more particularly in the field of eGovernment [38].

The objective of the IDABC programme was to identify, promote, and support [38]:

1. the development and establishment of European eGovernment services;
2. the underlying interoperable telematic networks supporting the European MSs and the European Community in the implementation of their respective

policies and activities, achieving substantial benefits for PAs, businesses, and citizens.

To achieve its objectives, the programme [38]:

- issued recommendations,
- developed solutions,
- provided services

that enable national and European administrations to communicate electronically while offering modern public services to businesses and citizens in Europe.

According to [46], it was designed to help to achieve targets set in the area of eGovernment by:

- continuing to promote the introduction of information technologies to policy domains, especially where this is facilitated by legislation;
- building a common infrastructure for cross-border information exchanges between PAs in order to ensure efficient communications;
- encouraging the emergence of novel services for businesses and citizens.

Therefore, the IDABC programme took advantage of the opportunities offered by ICT [38]:

- to encourage and support the delivery of cross-border public sector services to citizens and enterprises in Europe;
- to improve efficiency and collaboration between European PAs;
- to contribute to making Europe an attractive place to live, work, and invest.

The programme provided benefits to the following groups [38]:

- PAs, in particular national authorities and European institutions, because through providing a forum for information exchange and funding for IT solutions IDABC helped the administrations to improve the efficiency of their existing networks, it also offered generic services, common tools, and guidelines that facilitate interoperability across European borders;
- citizens and enterprises which had possibility to use directly some of the IDABC networks or more open and efficient public services;

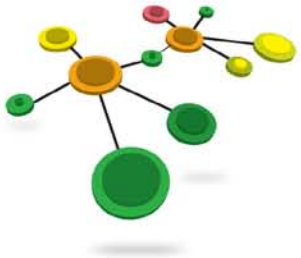
- IT and service providers which had opportunity to participate in the open calls for tenders in the framework of the programme.

The IDABC programme worked through providing funding to actions under two headings [38, 46]:

- PCIs, which focused on the use of IT solutions for specific sectors. They were actions in the policy areas of the EU concerning the establishment or enhancement of pan-European eGovernment services in support of PAs, businesses, and citizens. Access to the PCIs of the IDABC programme is available at http://ec.europa.eu/idabc/en/chapter/5637.html
- Horizontal Measures (HMs), which covered cross-sector networks, services, and tools. These measures were actions designed to support PCIs but also eGovernment in general. Firstly, they provided and maintained infrastructure services for public services in the Community. Secondly, they initiated, enabled and managed the provision of horizontal pan-European eGovernment services to businesses and citizens in Europe, including related organizational and coordination aspects. Access to the HMs of the IDABC programme is available at http://ec.europa.eu/idabc/en/chapter/5644.html

Interoperability is a key to all of IDABC's horizontal eGovernment-related activities [38]. According to [20], the main of them include the design of the EIF, the EIA Guidelines and the EIIS. In [38] additional activities are mentioned as well:

- first phase of the development of the EIS (available at http://ec.europa.eu/idabc/en/document/7772.html);
- development of the first version of the EIF (available at http://ec.europa.eu/idabc/en/document/2319/5644.html);
- study on infrastructure for cross-border eGovernment services (available at http://ec.europa.eu/idabc/en/document/3759/5886.html);
- development of architecture guidelines for eGovernment services (available at http://ec.europa.eu/idabc/en/document/2317/5890.html);
- setting up the NIFO (available at http://ec.europa.eu/idabc/en/document/7796.html);
- development of content interoperability strategy providing concerted and congruent approach to the content and semantic management of future cross-





border eGovernment services (available at http://ec.europa.eu/idabc/servlets/Doceb97.pdf?id=24405).

- "Case Study in the Euregio: Reducing the administrative burden of mobility" which objective was to determine how mobility across borders could be enhanced by exchanging data between civil registration authorities and other relevant offices (available at http://ec.europa.eu/idabc/en/document/3878/5886.html);
- promotion of Open Document Exchange Format (available at http://ec.europa.eu/idabc/en/document/3428/5890.html);
- establishing the SEMIC.EU platform as a single point of collaboration for information and guidance on semantic interoperability in Europe (available at http://ec.europa.eu/idabc/en/document/7742.html).

Therefore, while the IDA and IDA II programmes were focused on supporting Community services in the transition from paper-based administrations to modern services interacting by electronic means, the IDABC programme marked the end of this transition phase [47].

Open Document Exchange Format

According to [48], as information exchange via documents is at the hearth of any public sector activity, document interoperability becomes a central issue in any eGovernment strategy and here open document exchange format is needed to remove dependency on products and technologies by using standardised formats that promise interoperability of document processing. IDA and IDABC programmes were initiated actions to promote awareness and support of possible technological solutions. IDA established a working group to exchange experiences and discuss findings of studies initiated by the programme. The thrust of the IDA II initiative was to develop the foundations for a policy on open document exchange formats encouraging the implementation of open specifications and international standards. The Open Document Exchange Format initiative was an IDABC action towards formats allowing electronic documents to be exchanged among authorities, and between authorities, citizens and business in a way that does not force the use of specific software products and ensures universal readability of the documents. Documentation concerning the Promotion of Open Document Exchange Format is available at http://ec.europa.eu/idabc/en/document/3439/5585.html.

OSOR - Open Source Observatory and Repository

Three-year long project OSOR started in 2006 under the IDABC programme and in October, 2008 officially launched OSOR.eu platform with 35 hosted projects. Its main objective was to support the distribution and reuse of software developed by or for public sector administrations across Europe, connecting EU services and MSs. The project implemented a repository and collaborative development environment, or forge, targeting specifically European public sector organizations. It can be divided in two major components [49]:

- The Information Platform, targeted at PAs provides news, guidance, links, contacts, etc.
- The repository or Collaboration Development Environment is a library where software (source and object code), documentation, and knowledge is easily accessible according to a specific public sector taxonomy (or logical classification in multiple European languages).

In December 2011, Osor.eu was migrated to a new collaborative platform Joinup (see Section 6.2).

SEMIC

According to [50], the Semantic Interoperability Centre Europe (SEMIC.EU) is an infrastructure HM of the IDABC programme. The project collaborated closely with the MSs, industry experts, and other stakeholders and intended to facilitate the reuse of syntactic (e.g. XML schemas) and semantic assets (e.g. taxonomies, ontologies) needed for semantic interoperability by establishing the SEMIC.EU platform as a single point of collaboration for information and guidance on semantic interoperability in Europe. It is the pan-European service for semantic interoperability in eGovernment operating as a network of eGovernment projects. The platform www.semic.eu is built around a public web repository of real-life solutions referred to as "interoperability assets". They are provided by projects and organisations of all sectors. The assets (XML schemas, ontologies, taxonomies, other data models) are available for download and reuse by any European eGovernment project. SEMIC.EU also works as a communication platform for interested parties facilitating the creation of expert communities on semantic interoperability issues. In December 2011, Semic.eu was migrated to a new collaborative platform Joinup (see Section 6.2) and all its information on semantic interoperability is now available in the Semantic Assets section of this platform.

Bridge/Gateway Certification Authority (BGCA)

The BGCA is one of the security actions developed by the IDABC programme during the period 2002-2004. The action aimed to find a mechanism for national PAs to use electronic certificates issued by

their national certification authorities in trans-European (i.e. cross-border) communications with other MSs' administrations whereby trust and confidence can be established between these certification authorities. It was based on the study "A bridge CA for Europe's public administrations" (available at http://ec.europa.eu/idabc/en/document/3235.html#feasibility) produced in July 2002 under the IDA programme and related to examination of the feasibility of establishing a bridge or gateway certification authority to act as an intermediate trust infrastructure. Therefore, the overall objective of the action was to take the results from the feasibility study, and, with the participation of the MSs, to examine fully the implications of a bridge certification authority and carry out an interoperability pilot and derive some recommendations on technical, operational, and procedural aspects. The IDABC BGCA Pilot was launched in January 2005, and the prepared test programme was carried out. The results of the BGCA Pilot and the final recommendations for an operational BGCA were finalised in October 2005. As a follow-up of these recommendations a measure called "Operational Bridge/Gateway Certification Authority (BGCA)" was included in the revised version of the IDABC Work Programme (available at http://ec.europa.eu/idabc/en/document/6487/5938). The goal of this measure was to validate the achieved results with a real-case application, and to solve the remaining legal and organisational issues identified through the BGCA Pilot Project [51]. The model of the Bridge/Gateway Certification Authority is given in Figure 6.1.

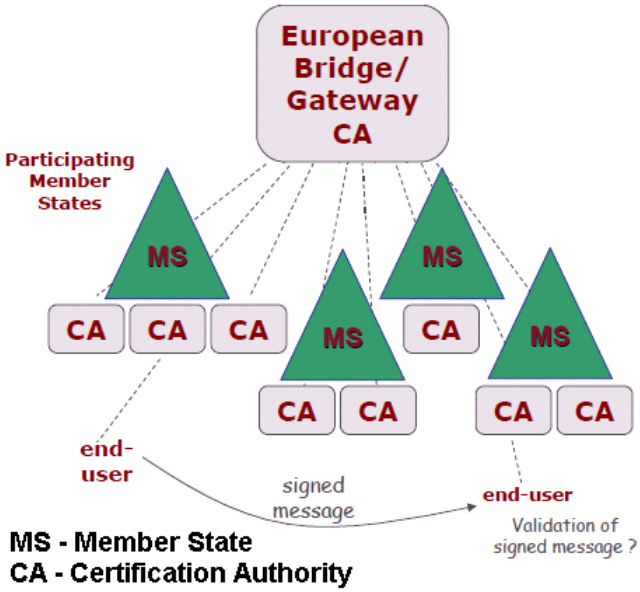



Figure 6.1. Bridge/Gateway Certification Authority Model (adopted from [52])

STESTA

In 1996, the IDA Programme set up a trans-European protected network – called TESTA – which interconnected EU institutions and agencies and MS administrations [53]. However, later it was replaced by a new network called STESTA developed in the framework of IDABC programme during period 2006-2008. Therefore, STESTA is an IDABC Infrastructure service to provide Trans-European Services for Telematics between Administrations. The kicked – off of the network was in mid 2007, and full migration was achieved by end of April 2008. Almost all EU Institutions, EU agencies and MSs are connected to STESTA [54].

STESTA constitutes the European Community's own private, IP-based network, isolated from the Internet and allows officials from different Ministries to communicate at a trans-European level (up to EU restricted) in a safe and prompt way. Therefore, it aims is to provide telecommunication services for data exchanges required for the implementation of European policy [54].

STESTA is a network of networks, composed of the EuroDomain backbone and Local Domain (national or regional networks, European Institutions or Agencies) networks. The EuroDomain [54]:

- is a European backbone network for administrative data exchanges acting as a network communication platform between local administrations;
- it allows any site connected to EuroDomain to communicate with any other linked site;
- it is totally isolated from the public Internet in this way guarantying restricted access as only administrations may access the EuroDomain.

Security in the network is also enhanced by the implementation of IPSEC technology to prevent eavesdropping and advanced encryption mechanisms. The STESTA domain-based approach allows national administrations to connect to European information sources while maintaining national autonomy in network implementation [54].

## 6.2. THE ISA PROGRAMME

The Decision on the programme "Interoperability Solutions for European Public Administrations" was adopted by the European Parliament and the Council on 16 September 2009 [55].

The programme addresses the following needs [56]:

- support the implementation of Community policies and legislation: from the internal market through the Lisbon Strategy [5] to the Services Directive (see Section 4);
- avoid e-barriers to cross-boundary interactions due to lack of interoperability and common and shared solutions.

The ISA programme focuses on back-office solutions supporting the interaction between European PAs and the implementation of Community policies and activities [28].

According to [55], the programme will support and promote:

- creation and improvement of common frameworks in support of interoperability across borders and sectors;
- assessment of ICT implications of proposed or adopted Community legislation as well as planning for the introduction of ICT systems in support of the implementation of such legislation;
- operation and improvement of existing common services as well as the establishment, industrialization, operation, and improvement of new common services;
- improvement of existing reusable generic tools as well as the establishment, provision, and improvement of new reusable generic tools.

The ISA programme is implemented by means of actions, i.e. studies and projects as well as accompanying measures supporting the implementation, and is structured in accordance with the activity clusters and accompanying measures defined in the EIS (see Section 5.1). The programme's actions are described in Table 6.2. Actions of particular interest in the context of interoperability are 1.1-1.7, 1.9, 2.1-2.3, 2.11-2.12, 4.1.2,4.2.1-4.2.3, 5.2.

Joinup

Joinup is a new collaborative platform created by the EC and funded by the EU via the Interoperability Solutions for Public Administrations (ISA) Work Programme. It offers a new set of services to help eGovernment professionals share their experience with interoperability solutions and support them to find, choose, re-use, develop, and implement open source software and semantic interoperability

assets. Joinup offers relevant content and insight in various areas of interest, including among others [57]:

- cross-border and cross-sector interactions between PAs;
- pan-European electronic public services;
- legal information on usage and development of open-source software within PAs;
- interoperability impact of EU regulations and actions;
- access to a repository of reusable semantic assets;
- methodologies and practice aids on the development of semantic interoperability assets;
- pan-European eGovernment projects.

The features of the site are [57]:

- communities of interest;
- Open Source Software incubator;
- Semantic Asset Repository;
- news;
- case studies;
- documents;
- forum;
- Issue Management System;
- etc.

The Joinup platform can be downloaded at https://joinup.ec.europa.eu/software/joinup/home.

### 6.3. ETEN AND ICT PSP PROGRAMMES

The programme "eTEN: Trans-European e-Services" funded projects supporting the deployment of innovative, trans-European ICT services in the public interest. Its funding was mainly used to support demonstration or pilot projects in their critical launch phase. Such support helped to test assumptions about the operating costs and the potential revenues, savings and public benefits of a service before a decision was taken on proceeding with full deployment [57].

In general, the eTEN programme covered the following themes: eGovernment, eHealth, eInclusion, eLearning, Services for SMEs, and Trust and security services. Most of the projects ended in 2009 [57].

In the theme "eGovernment" over 60 projects have received financial support [57]. However, searching by keywords "eGovernment", "public e-services", and "interoperability" provides only 3 results [58]:

- EU.POLIS - Contents & Commerce e-Services of collective interest - an European integrated City-Regional provider (March 2003 – August 2004). The goal of the project was to set-up and test a platform able to integrate the most significant local e-Contents and e-Commerce resources, making available a real unique territory guide for citizens, enterprises, tourists. A unified engine provided easy access to anybody to online local services available on the territory.
- IRENE - Innovative Tourism Business Approach Enabled by Federated Service Network (November 2001- April 2003). The project objective was to validate a new business chain for the tourism market, which focuses on the Destination Marketing Organizations and on the concept of federated service.
- SUPER - Single Unified Portal for Enterprise's Requests to Public Administrations (February 2011 – July 2002). The project addressed the obstacles to the full deployment of Single Points of Access for Enterprises to the PA. It carried out simultaneous implementation in the different locations, with common testing and market validation of new services, allowing cross-fertilization and exchange of best practices among the project partners.

ICT Policy Support Programme (ICT PSP) is a major component of the EU's Competitiveness and Innovation Framework Programme (CIP). Its main objective is to develop pan-European, ICT-based solutions and services, most notably in the areas of public interest [59].

Table 6.2

Actions of the ISA programme [37]

| Action cluster | Explanation | Specific actions |
|---|---|---|
| Trusted information exchange | The cluster tackles the challenges posed by the different administrative, technical and legal backgrounds of the MSs, which can hinder the smooth and secure transfer of data. The cluster deals with information that is exchanged cross-border, typically taking place in sector specific projects. The cluster addresses topics such as semantics, information availability and usage, trust and privacy, and the catalogue of services | • Improving semantic interoperability in European eGovernment systems - Methodologies for the development of semantic assets - Action 1.1<br>• Improving cross-border access to government data - Access to base registries - Action 1.2<br>• Accessing MS information resources at European level - Catalogue of Services - Action 1.3<br>• EU-wide interoperability of electronic identities - ECAS-STORK integration - Action 1.4<br>• An interoperable solution for electronic identities (eIDs) - STORK sustainability - Action 1.5<br>• Developing electronic procurement for Europe - PEPPOL sustainability - Action 1.6<br>• Promoting the take-up of pan-European electronic procurement - e-PRIOR electronic procurement platform - Action 1.7<br>• Permitting secure document workflows between EU and national institutions - Trusted Exchange Platform – e-Trustex - Action 1.8<br>• Electronic procedures across borders - TSL and eSignature creation/verification - Action 1.9<br>• Flexible administrative cooperation platform - IMI – the Internal Market Information System - Action 1.10<br>• Managing and supporting the exchange of information - GENIS – Generic Interoperable Notification Services - Action 1.11<br>• Reusable tools for information collection - Open source software to support the European citizens - Action 1.12<br>• Open Source software for editing legislation - LEOS – Legislation Editing Open Software - Action 1.13<br>• Development of a new cross-sector information system - SOLVIT – effective problem solving in Europe - Action 1.14<br>• Making administrative data available for reuse - Open Government Data - Action 1.15 |

Table 6.2 (continued)

Actions of the ISA programme [37]

| Action cluster | Explanation | Specific actions |
|---|---|---|
| Interoperability architecture | The cluster aims to further align cross-border and cross-sector IT infrastructures that are already available. The cluster addresses a broad range of activities:<br>• agreeing upon common architecture guidelines;<br>• creating the architecture itself;<br>• supporting the maintenance of the architecture;<br>• identifying and developing common building blocks. | • Towards a European Interoperability Architecture - Elaboration of a common vision for a European Interoperability Architecture – EIA - Action 2.1<br>• Achieving a modern ICT standardization policy - CAMSS - Common Assessment Method Standards and Specifications - Action 2.2<br>• Towards secure digital communication across networks - Public Key Infrastructure (PKI) Services - Action 2.3<br>• Strengthening the EU's telecommunications backbone - Data communication network service – sTESTA - Action 2.4<br>• Continual support and service improvements for online communities - CIRCABC – Communication and Information Resource Centre for Administrations, Businesses and Citizens - Action 2.5<br>• Sustaining Europe-wide consultations and surveys - IPM - Interactive Policy Making - Action 2.6<br>• Help and advice on living, working and travelling in the EU - Your Europe – facilitating the reuse of national content - Action 2.7<br>• Machine Translation Service - MT@EC - Machine Translation Service by the EC - Action 2.8<br>• Towards the full digitization of EU document exchange - Document repository services for EU policy support - Action 2.9<br>• Towards better crisis and business continuity management - Multisectorial crisis and business continuity services - Action 2.10<br>• Supporting EU-wide cross-border accessibility and interoperability - Integrating EU eProcurement infrastructure - Action 2.11<br>• Bringing cross-border interoperability to healthcare - eHealth European Interoperability Framework - Action 2.12 |

Table 6.2 (continued)

Actions of the ISA programme [37]

| Action cluster | Explanation | Specific actions |
|---|---|---|
| Assessment of the ICT implications of new EU legislation | Nowadays almost all implementation of new EU legislation requires the support of IT systems, e.g. for the exchange of information between authorities across borders or for the delivery of online public services to citizens. Consideration of ICT implications early in the drafting procedure will ensure a timely implementation of legislation and offers the possibility of reusing and adapting existing solutions as much as possible | • Contributing to efficient implementation of EU law - Assessment of ICT implications of EU legislation - Action 3.1 |
| Accompanying measures | In order to support the success of the other cluster actions, accompanying measures are set up. Typically, these are HMs. Actions in this cluster address the sharing of best practice and supporting communities. This will be done by providing the necessary tools, platforms, campaigns and support to the communities | • Communication for increased programme effectiveness - Communication activities - Action 4.1.1<br>• Assessing progress being made towards interoperability -Interoperability Maturity Model - Action 4.1.2<br>• Bringing together the eGovernment platforms - ISA Integrated Collaboration Platform - Action 4.2.1<br>• ISA collaborative platform: a hub for community building activities - Community building and effective use of the collaborative platforms - Action 4.2.2<br>• Towards a closer alignment of interoperability frameworks across Europe - NIFO - Action 4.2.3<br>• Evaluating progress in implementing the ISA Programme - Monitoring and Evaluation - Action 5.1<br>• Continuously updating the EIS - EIS Governance support - Action 5.2 |

Currently running projects funded by ICT PSP in the area of eGovernment are the following [59]:

- Pilots A:
  - STORK (Secure idenTity acrOss boRders linKed);
  - PEPPOL (Pan European Public Procurement OnLine);
  - SPOCS (Simple Procedures Online for Cross-border Services);
- Pilots B:
  - ECRN (European Civil Registry Network);
  - Rural-Inclusion (Rural-Inclusion: e-Government Lowering Administrative Burdens for Rural Businesses);
  - eGOS (e-Guidance and e-Government Services);
  - iSAC6+ (A unique European Citizens' Attention Service);
- Thematic networks:
  - eGovMoNet (eGovernment Monitor Network);
  - PEP-NET (Pan European E-Participation Network);
  - ADD ME! (Activating Drivers for Digital eMpowerment in Europe).

In the past, ICT PSP and IDABC programme complemented each other in relation to a number of activities. ICT PSP programme launched pilot actions and the IDABC programme delivered input in support of the pilot actions. Currently, actions launched under the ISA programme are continuously coordinated and aligned with the work ongoing under the ICT PSP and/or with the EC's internal ICT strategy as well as with actions undertaken in the context of the European eGovernment Action Plan 2011-2015 (see Section 3). The ISA programme with its narrower focus supplements the ICT PSP programme in certain areas, providing input as well as a framework for industrializing and operating results achieved through the ICT PSP pilot projects. The ICT PSP programme supports mainly pilot actions to show and validate the importance of ICT solutions in real settings, both pilot actions addressing innovative solutions or replication of best practices and pilot actions building on MSs ongoing initiatives. The ICT PSP programme does not support the implementation of solutions, which might require an EU layer. This layer can be supported by the ISA programme which endeavors to establish common operational and reusable ICT solutions which respond to generic needs expressed by administrative sectors and MSs. As a matter of fact, the ISA programme aims at supporting the

implementation of solutions whereas the ICT PSP programme aims at identifying potential solutions [28].

SSEDIC

According to [60], three-year SSEDIC project started in December 2010 within CIP-Thematic Network is related to building a Thematic Network for European eID which objective is to provide a platform for all the stakeholders of eID (electronic identity) to work together and collaborate to prepare the agenda for a proposed Single European Digital Identity Community as envisaged by the Digital Agenda (see Section 3) in its Key Action 16. The network is coordinated by NESTOR Tor Vergata University of Rome with participation of 35 European Partners.

Therefore, the ambition of this network is to build a community of high level European and international experts. The project will create the following outcomes [60]:

- for each Stakeholder Sector an electronically retrievable resource, containing the main consultations, consensus, and impacts;
- creation at the technical level an electronically retrievable roadmap of critical actions, milestones and timelines outlining how to achieve the vision of the Single European Digital Identity Community;
- a combined topological mapping of all the Stakeholder and Technical Sectors, which will be integrated into this single high level roadmap;
- a combined impact assessment summary, across all the Stakeholder and Technical Sectors integrating all business and regulatory issues.

Project deliverables are available at http://www.eid-ssedic.eu/index.php?option=com_content&view=article&id=104&Itemid=100101

### 6.4. MODINIS

The Modinis programme (2003-2006) provided financial support for the implementation of the eEurope 2005 Action Plan (see Section 4). It had the following objectives [62]:

- to monitor performance of and within MSs and to compare it with the best in the world by using, where possible, official statistics;
- to support efforts made by MSs in the framework of eEurope at national, regional or local level, by analyzing good practices and establishing a mechanism of exchange of experiences;

- to analyze the economic and societal consequences of the information society with a view to facilitating policy discussions, particularly in terms of industrial competitiveness and cohesion as well as in terms of social inclusion;
- to prepare for the establishment of the future structure at European level for network and information security issues.

Considering the work programmes available at http://ec.europa.eu/information_society/eeurope/i2010/archive/modinis/index_en.htm, it is possible to see that every year it had some activities and actions related to eGovernment. In the context of interoperability, the most important is the study provided in [18].

# 7. LARGE SCALE PILOTS

## 7.1. E-CODEX - E-JUSTICE COMMUNICATION VIA ONLINE DATA EXCHANGE

Website: http://www.e-codex.eu

Participants: Austria, Belgium, Czech Republic, Estonia, France, Germany, Greece, Hungary, Italy, Malta, The Netherlands, Portugal, Romania, Spain, Turkey, CCBE and CNUE

Duration: December 2010 - December 2013

The goal of the project is to improve the cross-border access of citizens and businesses to legal means in Europe as well as to improve the interoperability between legal authorities within the EU. e-CODEX will develop building blocks that can be used in- or between MSs to support cross-border operation of processes in the justice fields. These solutions, which will be developed in different areas from safe transportation to identity and rights management to document standards, should enable a safe environment for users (ranging from citizens and businesses to members of the different legal professions) to access a wide range of legal services across Europe and will contribute to the pan-European interoperability layer for electronic exchanges in Europe in the field of Justice. Therefore, e-CODEX is a functionality which provides an easier (digital) way to exchange legal information between EU-countries. One of the aims of the project is to achieve interoperability between existing national judicial systems [63]. The scope of the project is displayed in Figure 7.1.

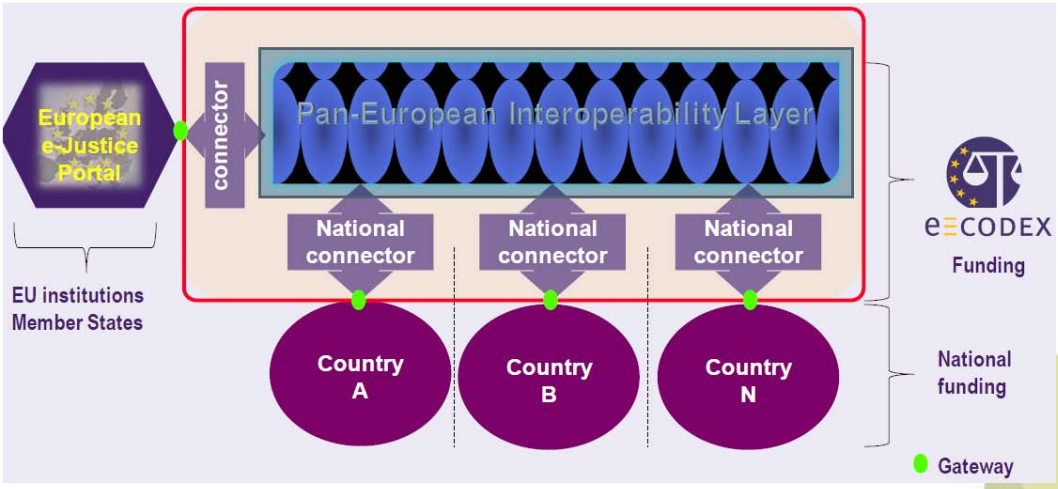



Figure 7.1. Scope of the e-CODEX project (adopted from [63])

In the technical work packages (4, 5 and 6) of the e-CODEX project, the three main building blocks for cross-border e-Justice interoperability will be developed [63]:

- identity;
- transport/payment;
- documents.

The seventh work package deals with integration of these building blocks. The mentioned work packages are specified in Table 7.1.

At the moment, the following deliverables are publicly available [63]:

- D4.1 – Identity inventory and requirements. It provides an overview about the existing national and EU-wide solutions for authentication, authorization, and signatures. The mentioned solutions are compared to the needs of the e-CODEX project to show, what can be reused and where something new has to be developed;
- D5.1 – Requirements. It lists the high level requirements for a cross-border interchange of data and documents in the judicial sector. Moreover, requirements for e-payment are also addressed;
- D6.1 – Requirements. The EIF presents requirements, principles, and guidelines that are a foundation for the semantic interoperability layer and other layers. This deliverable refines and adds to these guidelines to meet the legal and judicial perspective.
- D7.1 - Governance and Guideline Definition. This deliverable documents the activities carried out by the seventh work package to set up an architecture governance structure for the e-CODEX project and provides a description of such structure. It also presents a reference of the Standards and Architectural Guidelines to improve interaction, exchange, and cooperation among European PAs across borders and across sectors for the delivery of e-CODEX services. Furthermore, this delivery sets the general framework for the e-CODEX methodology discussion. The actual methodology, which provides a framework and guidelines describing how to document the architecture and specifications, so that the necessary types and levels of documentation fit together, is provided. Lastly, the delivery presents e-CODEX high level scenario models of use cases, and discusses the e-CODEX security policy, which provides the basic principles for a secure operational environment and the development of a 'circle of trust' among actors, citizens, businesses, legal practitioners and the judicial authorities, specifying the obligations of the parties.

Table 7.1

Work packages of e-CODEX project [63]

| Work package | General description | Goal | Scope and focus | Results |
|---|---|---|---|---|
| Work Package 4 - Identity and eSignatures | Identity is a core element in any dealings natural persons or legal entities have with each other, with governments, and with the wide range of participants in legal proceedings. Electronic identities, electronic signatures, and electronic mandates all exist in some form or other in the different MSs of the EU. Recognizing these identities and being able to use them, especially in cross-border cases, is by no means a trivial matter though. Identity in its various forms is thus a crucial building block to facilitate cross-border e-Justice in Europe. | Investigating and setting up interoperable solutions for authentication, authorization, and electronic signatures | The objective of e-CODEX is to enable secure electronic communication through the use of federated electronic identity and signature verification in cross-border e-Justice applications.<br>Practically this means that e-CODEX will develop solutions for the following:<br>• federation of national identity frameworks;<br>• discovery of message recipients;<br>• role semantics and mappings;<br>• implementation and verification of signatures;<br>• federation of signature verification.<br>The solutions developed by e-CODEX will be implemented, tested, and demonstrated in pilot applications. Wherever possible, this implementation builds on existing national eID infrastructures. Additional infrastructures will be developed or analyzed only if unavoidable. | • document on inventory and requirements giving overview of existing and possibly usable solutions within the EU and different MSs;<br>• document on analysis of different aspects of authentication, authorization, and electronic signatures and proposals of possible solutions;<br>• a broad array of software products will be affected by the standards, products, and services that will be developed during this pilot project. |

Table 7.1 (continued)

Work packages of e-CODEX project [63]

| Work package | General description | Goal | Scope and focus | Results |
|---|---|---|---|---|
| Work Package 5 - Exchange of documents/ data, eFiling and ePayment | This package addresses 2 main problems:<br>• eFiling - transportation of documents and information from the various actors in judicial processes. Such transportation needs to be able to deal with a diversity of transport solutions used in the different countries involved, both from the perspective of the judicial actors involved as well as the end users;<br>• ePayment - the payment of procedural costs to courts via electronic means is something that the actors involved need to take care of as part of the overall process. Countries have implemented different national solutions to take care of this, solutions which not all are equally easy to conduct across borders. | Aims at describing interface standards and develops the building blocks to enable the eFiling and e-Payment | The project aims to provide a solution to route documents and data throughout the various judicial processes, integrating the different constituents involved. It will aim to define a solution to interconnect different e-Delivery systems in Europe. The output is a set of interface descriptions(standards, concepts) as well as conception and a base implementation of an interoperable exchange mechanism for the pilot implementation. For this, e-CODEX will build on the transport solutions developed and piloted by other large scale pilots such as SPOCS and PEPPOL. Moreover, the project will define the requirements to enable such cross-border e-Payment interoperability and develop the necessary solutions to support this. The focus thereby is not on implementing specific industry payment solutions but instead to provide the interoperability layer such that cross-border payment can be conducted and that evidentiary evidence of this can be transported across countries and incorporated in the various use cases to which it applies. | • requirements;<br>• reusable assets;<br>• e-Delivery convergence solution. |

Table 7.1 (continued)

Work packages of e-CODEX project [63]

| Work package | General description | Goal | Scope and focus | Results |
|---|---|---|---|---|
| Work Package 6 - Document Standards and Semantics | The core of any judicial activity is the information that is being transported, signed, and identified. Such information is diverse in nature, ranging from process and actor information about the case at hand, supporting documentary evidence as well as information about the information (metadata). This information can be structured in the form of XML but also unstructured information for example with documentary evidence. Apart from the content of the information, there is also the form of the information, the document and the way they are packaged. The questions related to document standards become more complex in cross-border settings, where countries have different standards, different ways of packaging (and unpackaging) information, different semantical standards for structured data and so forth. | Presenting a generic data structure for a electronic message and to provide a method to define the semantics for the individual data elements present in the electronic message | • designing XML-messages for system-to-system communication between legal institutions and citizens and companies and legal institutions throughout the EU;<br>• XML messages based on data definitions from a repository;<br>• putting EIF principles into practical use for citizens, companies, and the European legal community;<br>• semantic modeling on 2 times 3 levels:<br>- use cases: legislation, legal and judicial procedures, business processes;<br>- abstraction: conceptual, logical, physical. | • scope, requirements and recommendations;<br>• inventory of existing solutions;<br>• methodology to develop and consolidate. |

Table 7.1 (continued)

Work packages of e-CODEX project [63]

| Work package | General description | Goal | Scope and focus | Results |
|---|---|---|---|---|
| Work Package 7 - Architecture | Different actors need the developed building blocks at different times. Seamless interaction between these building blocks is needed as well as being able to adapt for specific national solutions. In addition to this, these building blocks will build on- and re-use similar solutions developed in the other large scale pilots. | To ensure overall consistency between all the solutions e-CODEX will develop and also to guarantee that no requirements will be left unaddressed, the architectural work in e-CODEX aims to ensure integration of building blocks and of the set up of an architecture governance structure, giving guidance on how to integrate these building blocks and best practices | • analyzing and defining technical requirements for common building blocks;<br>• identifying potential and existing building blocks from running CIP projects and perform a fit gap analysis;<br>• integrating building blocks and defining the e-Justice architecture;<br>• identifying the high level processes (business and technology);<br>• ensuring the proper mapping of the e-Justice pilot's building blocks to the high-level processes;<br>• coordinate technical building blocks across WP4-6, thus ensuring successful technical coordination;<br>• reuse wherever possible existing standards and open architectures;<br>• guidance on:<br>- methodology documentation and development;<br>- security requirements, data protection and confidentiality;<br>- legal interoperability on pilot procedures related issues;<br>- legal interoperability on data protection issues;<br>• providing high level hands on guidance material. | • governance and guidelines definition:<br>- governance and organization;<br>- standards and guidelines;<br>- methodology;<br>- security polity;<br>• requirements finalization:<br>- high level use cases;<br>- document: functional requirements;<br>- document: non-functional requirements;<br>• high level architecture definition;<br>• architectural hands on material. |

### 7.2. EPSOS – EUROPEAN PATIENTS – SMART OPEN SERVICES

Website: http://www.epsos.eu

Participants: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Malta, Norway, Poland, Portugal, Slovenia, Slovakia, Spain, Sweden, Switzerland, The Netherlands, Turkey, United Kingdom

Duration: July 2008 - December 2013

The project aims to design, build, and evaluate a service infrastructure that demonstrates cross-border interoperability between electronic health record systems in Europe. It concentrates on developing a practical eHealth framework and ICT infrastructure that enables secure access to patient health information among different European healthcare systems [64].

epSOS will test cross-border eHealth services in the following areas [64]:

- in a first phase:
  - patient summary*:* access to important medical data for patient treatment;
  - cross-border use of electronic prescriptions ("ePrescription" or "eMedication" systems);
- in a second phase (epSOS enlargement phase):
  - integration of the 112 emergency services;
  - integration of the European Health Insurance Card (EHIC);
  - patient access to their data.

At the moment, 32 deliverables are publicly available at http://www.epsos.eu/home/download-area/deliverables.html.

### 7.3. PEPPOL – PAN-EUROPEAN PUBLIC PROCUREMENT ONLINE

Website: http://www.peppol.eu

Participants: Austria, Denmark, Finland, France, Germany, Greece, Italy, Norway, Portugal, Sweden, United Kingdom

Duration: May 2008 - April 2012

The project aims at expanding market connectivity and interoperability between eProcurement communities. PEPPOL enables access to its standards-based IT transport infrastructure through access points, and provides services for eProcurement with standardized electronic document formats. It addresses electronic public Procurement (thus not any generic public procurement issue falls within its domain) and focuses specifically on interoperability in eProcurement [65].

PEPPOL does not attempt to provide an integrated platform. It offers instead a modular set of IT specifications, and associated open source interoperable software solutions that any organization can easily install on its existing ERP systems to interoperate with others, exchanging specific business documents. The objective of the PEPPOL solutions is to facilitate cross-border transactions and to lower barriers for SMEs. The solutions have been designed to operate across European borders, regions, or business sectors [65].

At the heart of PEPPOL is an electronic transport infrastructure allowing governments and companies to connect their IT systems and reliably exchange data and business documents. A common agreement on cross border procurement processes, implemented through open standards, makes this possible. PEPPOL has developed the BIS and the BusDox as its principle standards. PEPPOL supports the use of UBL 2.0 documents and CEN/BII profiles. A CEN/BII (Business Interoperability Interfaces Profile) is a specification of how one or more business processes, such as ordering or invoicing, are executed. PEPPOL implements the CEN/BII profiles to define specific business scenarios. A PEPPOL Business Interoperability Specification (BIS) is a CEN BII Profile with additional legal, organizational and technical requirements to support pan-European use. The PEPPOL transport infrastructure uses a set of technical specifications known as BusDox (Business Document Exchange) to allow organizations to securely and reliably exchange electronic documents. BusDox is document agnostic, meaning users can transfer any kind of XML document between any network [65].

PEPPOL facilitates the pre-award and post-award procurement process with standardized components. In the pre-award phase, PEPPOL supports the public tender process with [65]:

- validation of eSignatures based on electronic certificates issued by authorities ;
- a Virtual Company Dossier to submit standardized company information (evidence, certificates and attestations);

- an eCatalogue to submit offers about goods and services in a standardized format.

In the post-award process, PEPPOL covers:

- the eCatalogue to exchange information about goods and services offered under the contract;
- eOrdering and eInvoicing providing the buyer and suppliers with defined procedures to share common business information;
- the Transport Infrastructure, the foundation of all PEPPOL post-award services, based on common, national IT compatible standards and interconnecting eProcurement communities.

The PEPPOL Enterprise Interoperability Architecture (EIA) is a structured approach to present the PEPPOL artifacts (project documents, specifications, user guides, software tools, etc.) in a repository so that different stakeholders can access information relative to their specific needs, in a consistent and flexible way. The PEPPOL EIA is a 3 dimensional cube (Figure 7.2). At the top, the cube comprises 4 interoperability communities, reflecting the PEPPOL components [65]:

- eSignature Validation Infrastructure – validates eSignature certificates across EU borders;
- Transport Infrastructure – enables pan-European eDelivery of business documents between the eProcurement communities;
- Post-Award eProcurement - enables the purchasing process consisting of eCatalogue, eOrdering, and eInvoicing;
- Pre-Award eProcurement – enables the tendering process currently consisting of eAttestation (VCD) and eCatalogue.

The above 4 communities are also linked to 6 dimensions [65]:

- ICT Architecture – providing the ICT scope, solutions, and ICT architecture for the interoperability community;
- Conformance and Test – comprising the requirements, processes, and tools of conformance for the different interoperability stakeholders;
- Life Cycle Management (LCM) – processes for LCM of business and ICT architectures;
- Governance - comprising the governance structure, legal framework, and processes for the business and ICT architectures;

- Marketing – including processes and material for increasing awareness and recruiting new participants for PEPPOL pilot projects;
- Business – being the business scope and business architecture of the interoperability community.

Work on the EIA is ongoing as development progresses. Currently, three of the six dimensions have been put into operation: ICT Architecture, Conformance and Test, and Governance.

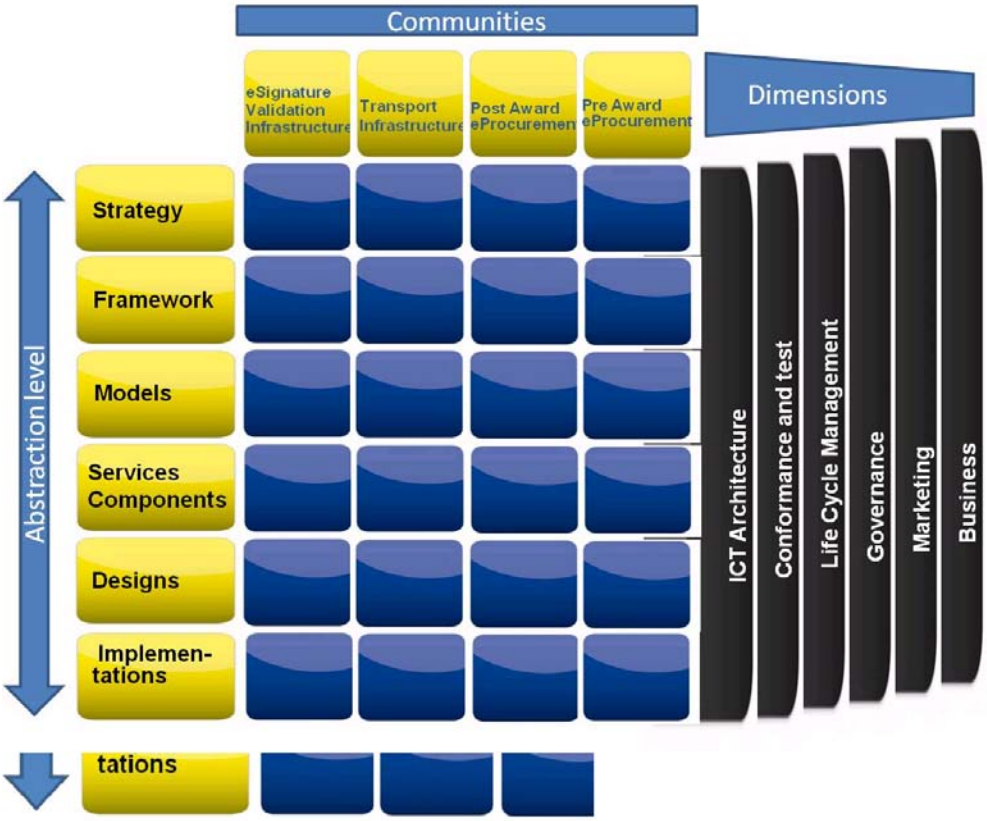



Figure 7.2. PEPPOL Enterprise Interoperability Architecture (adopted from [65])

Furthermore, each community dimension is divided into 5 abstraction levels [65]:

- Strategy;
- Framework;
- Models (guidelines and specifications of the different services and components);
- Services and Components;

- Designs;
- Implementations.

Strategy, Framework, Models, Services and Components are generic artefacts where the Models can be instantiated into specific designs and implementations. The Services and Components can be used in the specific designs and incorporated into the implementations.

A number of deliverables are publicly available at http://www.peppol.eu/about_peppol/results.

### 7.4. SPOCS - SIMPLE PROCEDURES ONLINE FOR CROSS-BORDER SERVICES

Website: http://www.eu-spocs.eu

Participants: Austria, France, Germany, Greece, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Sweden, United Kingdom

Duration: May 2009 - April 2012

The project is closely related to the Service Directive (see Section 4) which implementation calls for setting up PSCs. The PSCs are acting as intermediaries between service providers and the national PAs. SPOCS aims to build the next generation of online portals PSC that every European country now has in place, through the availability of high impact cross- border electronic procedures. Therefore, the SPOCS pilots are using the SPOCS building blocks for Syndication, eDocuments, eDelivery, eSafe and eServices in the national production environment of the PSCs in MSs [66].

The aim of SPOCS is to develop an interoperability layer to foster the services economy in Europe by facilitating the Service Providers to apply via the PSC for businesses the EU MSs have set up. Therefore, the aim of our pilot is to show that the building blocks developed within SPOCS composing this interoperability layer indeed do function in a real life environment. The process followed within the SPOCS to reach live testing consisted in [66]:

1. specifying the SPOCS building blocks (Syndication, eDocuments, eDelivery, eSafe, and eServices);
2. developing the SPOCS building blocks based on their specifications;
3. deploying them in the SPOCS piloting countries;

4. assessing the results and iteratively adapting the specifications and modules as needed;
5. scaling and sustaining the SPOCS building blocks.

The work packages related to technical activities are the following [66]:

- WP 1: Content syndication, multilingual issues, and glossary. Its objective is to enable content syndication related to glossaries and the multilingual reality. 27 different MSs, 23 different languages, 3 different alphabets – content syndication + multilingual issues must be qualified. Syndication is used to supply SPOCS enabled PSC's the metadata on the available licenses, procedures, and other relevant information available from competent authorities;
- WP 2: eDocuments. Its objective is to enable understanding and recognition of eDocuments and their authentication and validation processes. SPOCS will develop interoperability models and common specifications for documents to assist convergence and reduce heterogeneity;
- WP 3: Interoperable delivery, eSafe, secure and interoperable exchanges and acknowledgement of receipt. The objective is to to enable understanding and recognition of eDelivery systems in different MSs. SPOCS will provide solutions such that competent authorities and PSCs of one MS can effectively communicate the outcome of an administrational procedure (usually eDocuments) to a service provider or agency in another MS;
- WP 4: Interoperable eService Directories. Its objective is to enable definition and description of services to form a better understanding and recognition of eServices that are provided in different national service directories. SPOCS will focus on structuring and seamlessly connecting resources and systems (i.e. directory services/relational databases) containing information about authorities and services.

A number of deliverables are publicly available at http://www.eu-spocs.eu/index.php?option=com_processes&task=showProcess&id=18&Itemid=61. For the interest reader, the deliverables with the SPOCS specifications are [66]:

- D1.3: SPOCS Syndication Architecture;
- D2.2: Standard Document and Validation Common Specifications;
- D3.2: Specifications for Interoperable Access to eDelivery and eSafe Systems;
- D4.2: Specifications for interoperable access to public service directories.

### 7.5. STORK - SECURE IDENTITY ACROSS BORDERS LINKED

Website: https://www.eid-stork.eu/

Participants: Austria, Belgium, Estonia, France, Germany, Greece, Iceland, Italy, Luxembourg, The Netherlands, Portugal, Slovenia, Spain, Sweden, United Kingdom

Duration: June 2008 - June 2011

The aim of the STORK project is to establish a European eID Interoperability Platform that will allow citizens to establish new e-relations across borders, just by presenting their national eID. Cross-border user authentication for such e-relations will be applied and tested by the project by means of five pilot projects that will use existing government services in EU MSs. The STORK project will make it easier for citizens and businesses to access online public services across borders by developing and testing common specifications for mutual recognition of national electronic identity (eID) between participating countries. It will do so by [67]:

- developing common rules and specifications to assist mutual recognition of eIDs across national borders;
- testing, in real life environments, secure and easy-to-use eID solutions for citizens and businesses;
- interacting with other EU initiatives to maximize the usefulness of eID services.

STORK will focus on pragmatic eID interoperability solutions, implementing several pilot cross-border eID services chosen for their high impact on everyday life.

STORK will test cross-border services in five areas [67]:

- a demonstrator showing that cross-border electronic services can operate in a number of MSs;
- Student Mobility, to help people who want to study in different MSs;
- Electronic Delivery, to develop cross-border mechanisms for secure online delivery of documents;
- Change of Address, to assist people moving across EU borders.

The deliverables and the developed software are available at https://www.eid-stork.eu/index.php?option=com_processes&act=list_documents&s=1&Itemid=60&_id=312. Description of pilots available at https://www.eid-stork.eu/index.php?option=com_content&task=category&sectionid=8&id=48&Itemid=83

# 8. NATIONAL DIMENSION OF EGOVERNMENT AND INTEROPERABILITY

Paying attention to national dimension of eGovernment and interoperability of public services in the countries participating in the ELGI project, the following main points are considered:

1. legal framework in the field of eGovernment;
2. existence of explicit eGovernment roadmap;
3. instruments used in each country for provision of public services, supporting effective performance of PA and ensuring communication between PA and citizens/businesses;
4. the current situation with NIFs.

Table 8.1 contains summarization on the existent legal framework in the field of eGovernment in each of the participating countries. The summarization was obtained on the basis of information from [68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79]. The table provides evidence that all of the participating countries have good coverage of the main aspects related to eGovernment by legal regulations.

Considering existence of eGovernment roadmap, it is necessary to note that all countries participating in the project have developed national plans for further development of eGovernment. In Spain, the roadmap is a multilevel strategy including strategic plans at national, regional, and local level. All of them are defined under criteria of the NIF [68]. In January 2011, a new revised Strategy for Electronic governance was adopted in Bulgaria. On the basis of the above mentioned document a Roadmap for realization of the strategy for the period of 2011 – 2015 is adopted as well [69]. The Italian eGovenrment Plan 2012 was issued in 2008. At the moment, a body called DigitPA coordinates modernization of the instruments and procedures for the activities of PA. This body has also established working groups to define the technical requirements and guidelines relating to strategic aspects of the process: creation of electronic documents, preservation tools, management of document flows, digital identity management, digital signature, etc [70]. In Latvia, the “eGovernment Development Plan (2011-2013)” is a short-term development planning document primarily based on the “National Development Plan 2007-2013”. It introduces 192 actions which aim to boost eGovernment, to strengthen state policy, and to complement regulatory actions in a wide range of domains (e.g. eSkills, broadband access, eIdentification, eProcurement, eInvoice, eJustice, eHealth, mobility, and social security) by taking into account the priorities of the EU Ministerial Declaration on eGovernment policy and the Digital Agenda

Table 8.1

Legal framework on eGovernment

| **Bulgaria** | |
|---|---|
| **eGovernment** | e-Governance Act (Law on Electronic Governance) (2008) |
| **Data protection/privacy** | Law for Protection of Personal Data (2001) |
| **eCommerce** | Law on e-Commerce (2006) |
| **eCommunications** | Law on Electronic Communications (2007)<br>Telecommunications Act (2003) |
| **eSignature** | Law on Electronic Document and Electronic Signature (2011)<br>e-Governance Act (2008) |
| **eIdentification** | e-Governance Act (Law on Electronic Governance) (2008)<br>Law on Electronic Document and Electronic Signature (2011) |
| **eProcurement** | Public Procurement Law (2004) |
| **Re-use of public sector information** | Access to Public Information Act (2007) |
| **Electronic access to public services** | e-Governance Act (Law on Electronic Governance) (2008) |
| **eDocuments** | Law on Electronic Document and Electronic Signature (2011) |
| **eRecords** | Law on National Stock of Archives (2009) |
| **Access to spatial data** | Law on access to spatial data (2010)<br>Law on Cadastre and Property Register (2008) |
| **Other documents** | Law on book-keeping (2002)<br>Law on the Customs (2003)<br>Tax-Insurance Procedure Code (2006) |

Table 8.1 (continued)

Legal framework on eGovernment

| Greece | |
|---|---|
| **eGovernment** | Law on eGovernment (eGovernment Act) (3979/2011) |
| **Data protection/privacy** | Law on the Protection of Individuals with regard to the Processing of Personal Data (Law 2472/1997)<br>Law on the Protection of Personal Data and Private Life with regard to Electronic Telecommunications (Law 3471/2006)<br>Law on Strengthening the Institutional Framework to Safeguard Privacy of Telephone Communications (Law 3674/2008) |
| **eCommerce** | Presidential Decree 131/2003 on eCommerce |
| **eCommunications** | Law on Electronic Communications and other Provisions (2006) |
| **eSignature** | Presidential Decree 150/2001 |
| **eIdentification** | Law on e Government (3979/2011), Chapter Z' |
| **eProcurement** | Presidential Decree 118/2007 on the Regulation of Public Procurement<br>Presidential Decree 59/2007<br>Presidential Decree 60/2007 |
| **Re-use of public sector information** | aw on Re-use of Greek Public Sector Information (2003)<br>Law 3448/2006 (reuse of public sector information) – Implementing the Directive 2003/98/EC of the European Parliament and of the Council of 17 November 2003 on the re-use of public sector information |
| **Electronic access to public services** | Law on e Government (3979/2011) |
| **eDocuments** | Law on e Government (3979/2011), Chapter E', Article 12 on electronic documents |
| **eRecords** | Law on e Government (3979/2011) |
| **Access to spatial data** | Law 3882/2010 (reuse of geospatial information) – Implementing the Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) |
| **Other documents** | Law 2690/1999 for Access to public documents<br>Law 3861/2010 ensures that all public sector authorities publish their decision over the Internet in order to be valid.<br>Law 3979/2011 contains specific provisions with regards to the procurement of software that is originally built for the public sector that coincide with the main principles of F/OSS. |

Table 8.1 (continued)

Legal framework on eGovernment

| **Italy** | |
|---|---|
| **eGovernment** | Decree n. 235 of 30 December 2010-Digital Administration<br>Legislative Decree n. 177 of 1 December 2009<br>Legislative Decree n. 150 of 27 October 2009 on the implementation of Law n. 15/2009<br>Decree n. 2/09 of 6 May 2009<br>Law n. 2/09 (2009)<br>eGovernment Code (2006)<br>Decree of the President of the Republic n.445/2000<br>Decree of the Presidency of the Council of Ministers of 14th October 2003<br>Decree Law 82/2005 - Digital Administration Code<br>Legislative Decree n. 235/2010<br>Decree of President of the Council of Ministers on 30th March 2009<br>Law n. 69/2009<br>Deliberation CNIPA of 21st May 2009 n.451<br>Directive of the del Minister for Public Administration and Innovation n.8/2009<br>Decree of the President of the Republic on 7th September 2010, n.160<br>Ministerial Decree on 13th July 2011 |
| **Data protection/privacy** | Data Protection Code (2004)<br>Decree of President of the Council of Ministers on 30th March 2009<br>Deliberation CNIPA of 21st May 2009 n.451<br>Legislative Decree n. 150 of 27 October 2009 on the implementation of Law n. 15/2009 |
| **eCommerce** | Legislative Decree on Electronic Commerce (2003) |
| **eCommunications** | Electronic Communications Code (2003)<br>Decrees on certified electronic mail (2009)<br>Law n. 69/2009<br>Deliberation CNIPA of 21st May 2009 n.451<br>Directive of the del Minister for Public Administration and Innovation n.8/2009<br>Legislative Decree n. 150 of 27 October 2009 on the implementation of Law n. 15/2009<br>Ministerial Decree on 13th July 2011 |

Table 8.1 (continued)

Legal framework on eGovernment

| Italy | |
|---|---|
| **eSignature** | Legislative Decree n. 10 on Electronic Signatures (2002)<br>eGovernment Code (2005)<br>Decree of the President of the Republic n.445/2000<br>Law n. 2/09 (2009)<br>Decree of President of the Council of Ministers on 30th March 2009<br>Deliberation CNIPA of 21st May 2009 n.451<br>Legislative Decree n. 150 of 27 October 2009 on the implementation of Law n. 15/2009 |
| **eIdentification** | Decree of the President of the Republic n.445/2000<br>Legislative Decree n. 235/2010<br>Decree of President of the Council of Ministers on 30th March 2009<br>Decree n. 2/09 of 6 May 2009 |
| **eProcurement** | Public Procurement Code (2006); Presidential Decree DPR 101/2002<br>Decree Law 82/2005 - Digital Administration Code<br>Legislative Decree n. 235/2010<br>Law n. 2/09 (2009)<br>Decree of President of the Council of Ministers on 30th March 2009<br>Law n. 69/2009<br>Directive of the del Minister for Public Administration and Innovation n.8/2009<br>Legislative Decree n. 177 of 1 December 2009<br>Decree of the President of the Republic on 7th September 2010, n.160<br>Ministerial Decree on 13th July 2011 |
| **Re-use of public sector information** | Legislative decree no. 36 (2006)<br>Decree of the President of the Republic n.445/2000<br>Legislative Decree n. 177 of 1 December 2009<br>Decree of the President of the Republic on 7th September 2010, n.160 |

Table 8.1 (continued)

Legal framework on eGovernment

| **Italy** | |
|---|---|
| **Electronic access to public services** | Decree of the Presidency of the Council of Ministers of 14th October 2003<br>Decree Law 82/2005 - Digital Administration Code<br>Law n. 2/09 (2009)<br>Law n. 69/2009<br>Decree n. 2/09 of 6 May 2009<br>Directive of the del Minister for Public Administration and Innovation n.8/2009<br>Decree of the President of the Republic on 7th September 2010, n.160<br>Ministerial Decree on 13th July 2011 |
| **eDocuments** | Decree of the President of the Republic n.445/2000<br>Decree of the Presidency of the Council of Ministers of 14th October 2003<br>Decree Law 82/2005 - Digital Administration Code<br>Legislative Decree n. 235/2010<br>Law n. 2/09 (2009)<br>Decree of President of the Council of Ministers on 30th March 2009<br>Law n. 69/2009<br>Deliberation CNIPA of 21st May 2009 n.451<br>Legislative Decree n. 150 of 27 October 2009 on the implementation of Law n. 15/2009 |
| **eRecords** | Decree of the President of the Republic n.445/2000<br>Decree of the Presidency of the Council of Ministers of 14th October 2003<br>Decree Law 82/2005 - Digital Administration Code<br>Legislative Decree n. 235/2010<br>Law n. 2/09 (2009)<br>Decree of the President of the Republic on 7th September 2010, n.160 |
| **Access to spatial data** | Decree n. 32 of 27 January 2010<br>Decree of the President of the Republic on 7th September 2010, n.160 |
| **Other documents** | Legislative Decree n. 177 of 1 December 2009 |

Table 8.1 (continued)

Legal framework on eGovernment

| **Latvia** | |
|---|---|
| **eGovernment** | No explicit law, partly Law on State Information Systems (2002) |
| **Data protection/privacy** | Personal Data Protection Law (2000)<br>Information Technologies Security Law (2011) |
| **eCommerce** | Law on Information Society Services (2004) |
| **eCommunications** | Electronic Communications Law (2004) |
| **eSignature** | Electronic Documents Law (2002) |
| **eIdentification** | Personal Identification Documents Law (2002) |
| **eProcurement** | Regulations regarding rules for centralized electronic procure (n.1241, 2010)<br>Law on Public Procurement (2006)<br>Law on Procurement for the Needs of Public Services Providers (2010) |
| **Re-use of public sector information** | Freedom of Information Law (1998)<br>Regulations regarding rules for paid services on provision of information (n.940, 2006)<br>Regulations regarding order how exclusive rights for re-use of information are assigned and how the information on the assignment of such rules is made publicly available (n.338, 2007 ) |
| **Electronic access to public services** | No explicit law |
| **eDocuments** | Electronic Documents Law (2002) |
| **eRecords** | Regulations regarding the manner of appraisal of electronic records, procedures for the storage thereof and transfer to the state archives for storage (Nr. 85206, 2004) |
| **Access to spatial data** | Partly Regulations regarding order for demanding and delivering of information from the State Cadastre of real estate (n.46, 2007) |
| **Other documents** | |

Legal framework on eGovernment

| **Poland** | |
|---|---|
| **eGovernment** | Act on the Computerisation of the Operations of the Entities Performing Public Tasks (2005) |
| **Data protection/privacy** | Act on the Protection of Personal Data (1997)<br>Draft Regulation on the Compilation of Writings in the form of Electronic Documents (2011) |
| **eCommerce** | Act on Providing Services by Electronic Means (2003)<br>Act on the Protection of Certain Services provided by Electronic Means based on, or relying on conditional access (2002)<br>Act on Electronic Payment Instruments (2002) |
| **eCommunications** | Telecommunications Law (2004)<br>Act on the Development of Telecommunications Services and Networks (2010) |
| **eSignature** | Act on Electronic Signatures (2001)<br>Draft Regulation on the Technical Requirements for Electronic Identity Card Layer and Communication Protocol for Electronic Identity Cards (2011) |
| **eIdentification** | Ordinance on Detailed Organizational and Technical Conditions to Be Met by Teleinformation System Used for User Identification (2011) |
| **eProcurement** | Public Procurement Law (2004) |
| **Re-use of public sector information** | Draft law amending the Law on Access to Public Information and related laws (2011) |
| **Electronic access to public services** | Ordinance on The scope and Conditions of Using Electronic Platform of Public Administration Services (2011) |
| **eDocuments** | Ordinance on Drafting Letters in the Form of Electronic Documents, Electronic Letter Delivery and Providing Access to Forms, Templates and Copies of Electronic (2011) |
| **eRecords** | Ordinance on Technical Requirements for the Formats of Records and Information Data Carriers of Which Archive Materials Submitted to the National Archives Have Been Recorded |
| **Access to spatial data** | Act on Spatial Information Infrastructure (2010) |
| **Other documents** | Ordinance on Minimum Requirements for Public Registers and Exchange of Electronic Information (2005)<br>Act on General Registry (2010) |

Table 8.1 (continued)

Legal framework on eGovernment

| **Spain** | |
|---|---|
| **eGovernment** | Law on Citizens' Electronic Access to Public Services<br>Royal Decree 1671/2009<br>Royal Decree 4/2010, National Interoperability Framework<br>Law on the Establishment of a Notification System by Means of Electronic Address<br>Royal Decree 136/2010<br>Royal Decree 137/2010 |
| **Data protection/privacy** | Law on the Protection of Personal Data<br>Royal Decree 3/2010<br>Law on Citizens' Electronic Access to Public Services |
| **eCommerce** | Law on Information Society Services and Electronic Commerce |
| **eCommunications** | General Telecommunications Law |
| **eSignature** | Law on Electronic Signature<br>Law on Citizens' Electronic Access to Public Services<br>Royal Decree 4/2010, National Interoperability Framework |
| **eIdentification** | Chapter II, Law on Citizens' Electronic Access to Public Services (LAECSP). |
| **eProcurement** | Law on Public Sector Contracts<br>Law on Procurement Procedures in the Water, Energy, Transport and Postal Services Sectors<br>Ministerial Order on Electronic Invoicing |
| **Re-use of public sector information** | Law on the Re-use of Public Sector Information<br>Royal Decree Implementing the Law on the Re-use of Public Sector Information |
| **Electronic access to public services** | Law on Citizens' Electronic Access to Public Services |
| **eDocuments** | Law on Rules for Public Administration |
| **eRecords** | Law on Citizens' Electronic Access to Public Services (LAECSP) |
| **Access to spatial data** | Law on Citizens' Electronic Access to Public Services (LAECSP) |
| **Other documents** | Law on Measures to Promote Information Society<br>Regulation on Access to Technologies, Products and Services Related to Information and Communication Society |

for Europe [71]. The Strategy for the Development of the Information Society until 2013 exists in Poland [72]. In Greece the eGovernment roadmap is an action plan, supported by the Ministry of Administrative Reform and eGovernment, whose aim is to effectively implement the Greek eGovernment Act [73].

Each country has already implemented and is using a number of instruments for service provision and communication between bodies of PA and citizens/businesses, as well as for effective performance of PA. These instruments are quite different starting from portals providing information to citizens and businesses, for example,

- "Ermis" (http://www.ermis.gov.gr) is the governmental portal of PA aiming to inform citizens and businesses, and to ensure the safe use of eGovernment services (Greece) [73];
- "Opengov.gr" (http://www.opengov.gr/home/) is a portal dedicated to respond to citizens' needs for information, merit, and participation in shaping decisions (Greece) [73];
- ePUAP (Electronic Platform of Public Administration Services) (http://epuap.gov.pl) enables defining citizen and businesses service processes, creates channels of access to different systems of PA, and extends the package of public services provided electronically (Poland) [72];
- eGovernment Portal "PAe" (http://administracionelectronica.gob.es) is a gateway to all information on status, analysis, news, and initiatives from around the administration, content, and services from diverse sources, making the aggregator of opinion, participation and dynamic engine of the whole community with interests in different areas (Spain) [68];
- "Italia.gov.it" (http://www.italia.gov.it/itagov2/) is a search engine and an index of websites of PA, developed and managed by DigitPA with purpose to facilitate the relationship government-to-business and government-to-citizen (Italy) [70];
- "ePakalpojumi.lv" (https://www.epakalpojumi.lv) contains a number of integrated e-services, which gathers data from the Latvian authorities, State institutions, and commercial companies (Latvia) [71];

and finishing with some specific applications and services like:

- "TAXISnet" (www.taxisnet.gr) provides services to citizens, enterprises, and corporate tax-payers, including electronic submission of VAT forms andpayment of VAT via banking system services, electronic submission of income tax forms, personalized electronic notification of the results of the tax return clearance process, and the electronic issuing of certificates by fax (Greece) [73];

- "Geodata" (http://www.geodata.gov.gr) is a catalogue and web mapping framework providing open geospatial data to citizens (Greece) [73];
- The eDeclarations system (http://www.e-deklaracje.gov.pl) makes it possible for every Polish taxpayer to submit their tax declaration electronically (Poland) [72];
- SARA Platform (Red SARA) Common Communications Infrastructure (SARA network) is a private communications network interconnecting all government ministries and all the Autonomous Communities, and almost 50% of Local Authorities (Spain) [68];
- The Standards Register (http://rs.esmis.government.bg/Standards/_default.aspx) contains the technical standards (Bulgaria) [69];
- The Information Objects Register (http://pe.test.egov.bg/ereg-public/rio/home.rg) contains description of all information objects by using defined technical standard (Bulgaria) [69];
- Joint Information System for Municipalities (http://www.vraa.gov.lv/en/egovernance/) which provides technological support to municipalities of Latvia for accessing their services electronically by creating a joint data accounting and exchange systems that are compatible. Currently it provides not only such municipal functions as registration of the population, registration of the real estate, gathering and storing data of the registry offices, and social service providers, but also data exchange with Population Register, Real Estate State Cadaster Information System, State Address Register, Vehicle and Drivers' State Register (Latvia) [71].

On the basis of information provided by NIFO [80, 81, 82, 83, 84, 85], Table 8.2 summarizes the current development level of NIF and its alignment with the EIF in each partner country participating in the ELGI project. All countries excluding Latvia have already adopted or drafted NIF. Spain has the NIF most aligned with the EIF, but Polish NIF is most weakly aligned.

More information on national policies and practices in the area of eGovernment and interoperability in the countries participating in the project can be found in national reports [68, 69, 70, 71, 72, 73] available at the project website http://www.elgiproject.eu.

Table 8.2

The current situation with NIFs

| Country | NIF | Alignment NIF/EIF | Missing items in NIF |
|---|---|---|---|
| Bulgaria | The latest version of the Bulgarian NIF for governmental information systems dates from June 2006. No release date for a next version has been provided. | The Bulgarian NIF is strongly aligned with the EIF on the 'conceptual model' and the 'interoperability levels'. The 'interoperability agreements' and the 'principles' are fairly aligned with EIF and no framework for interoperability governance was observed | The NIF is aligned only with half of the EIF principles (user-centricity, inclusion and accessibility, security and privacy, multilingualism, preservation of information and technological neutrality, and adaptability)<br>Evidences of an infrastructure to interconnect loosely coupled service components are not observed<br>The NIF does not describe the interoperability level 'legal' as such but provides a law of electronic governance and an ordinance on the general requirements for interoperability and information security<br>No observations could be made regarding the business processes and organizational relationships<br>No agreements on minimum service requirements for secure data exchange could be observed<br>The existence of a governance framework to control the interoperability activities across administrative levels has not been observed |
| Greece | Greece has the NIF that has been regulated in the Law 3731/20081. A ministerial decision is still to be issued in order to define the concrete implementation guidelines | The Greek NIF has a very strong alignment with the EIF on the 'interoperability levels'. There is hardly any alignment on the 'principles' and the 'conceptual model'. There is no alignment with the 'interoperability agreements' and no framework for interoperability governance were observed | The NIF is aligned only with four of the twelve EIF principles (user-centricity, inclusion and accessibility, security and privacy, and transparency)<br>The Greek NIF does not contain any form of conceptual model. No observations could be made encouraging the usage of a component based service model and nor regarding the related infrastructure to interconnect loosely coupled service components. Evidences encouraging the use of common schemes to interconnect loosely coupled service components were not observed. The NIF does not describe the usage of authentic sources.<br>No observations were made regarding the existence of change management procedures to ensure continuous service delivery<br>No interoperability agreements could be observed<br>The existence of governance framework to control the interoperability activities across administrative levels has not been observed |

Table 8.2 (continued)

The current situation with NIFs

| Country | NIF | Alignment NIF/EIF | Missing items in NIF |
|---|---|---|---|
| Italy | Italy has drafted a NIF consisting of a legal framework Digital Administration Code (DAC) and an ICT interoperability framework Sistema Pubblico di Connettività e Cooperazione (SPC), which is deployed to enforce the DAC | The Italian NIF is nicely aligned with the EIF, especially in terms of interoperability governance, conceptual model, and principles | Although no list of principles is given explicitly by the SPC or DAC, most of the EIF principles are mentioned in the details of the legal text<br>The SPC describes several legally binding interoperability agreements, such as service agreements and cooperation agreements, but does not fully align to the EIF as PAs are not encouraged to participate in standardization work and to assess and select formalized specifications<br>The Italian interoperability framework discusses all interoperability levels, but only a limited alignment to the EIF was observed as (1) no explicit business processes of PAs are given, (2) organizational relationships are not really detailed as part of European public services, and (3) connecting to cross-sectoral communities that aim to facilitate semantic interoperability was not fully stimulated |
| Latvia | Although no explicit interoperability framework exists, guidance on interoperability is given by legal acts on state information systems and by documentation of Latvian integration platforms | The Latvian NIF is partially aligned with the EIF, due to a strong focus on technical aspects and less on legal, organizational and semantic aspects | The NIF uses interoperability agreements to a certain extent (i.e., to define technical interfaces between different systems), but does not deal with other legally binding agreements<br>Not all interoperability levels are discussed in depth, with a strong focus on the technical level, including technical specifications of semantics (i.e., technical XML definition of semantic concepts, without defining the meaning of the concepts from an organizational point of view)<br>The technical platforms embed different interoperability principles in an implicit way, but - except from security and open standards- no explicit principles are specified<br>No references to interoperability governance are found |

Table 8.2 (continued)

The current situation with NIFs

| Country | NIF | Alignment NIF/EIF | Missing items in NIF |
|---|---|---|---|
| Poland | Poland has drafted a NIF for which the approval by the Council of Ministers is foreseen in the near future | The Polish NIF is for all dimensions weakly aligned with the EIF | Only principles of inclusion and accessibility, administrative simplification, effectiveness and efficiency and partially the principle of technological neutrality, and adaptability are considered. The other principles are not observed in the regulation<br>No conceptual model is observed in the regulation<br>The legislative level is not mentioned but the regulation refers to the applicable law and the NIF itself will have legal value after being approved<br>No interoperability governance is observed in the Polish NIF |
| Spain | The Spanish NIF is a Royal Decree (4/2010) which develops provisions about interoperability stated in the eGovernment Law (11/2007) and is applicable to all PAs in Spain | Spain is fully aligned with the EIF on the 'governance' and the 'principles'. It has a good alignment on the 'conceptual model', and the 'interoperability levels' and 'interoperability agreements' | |

## INFORMATION SOURCES


1. Annex 1 “European Interoperability Strategy for European public services”, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions “Towards interoperability for European public services”, COM(2010) 744 final, 16.12.2010, Brussels, Belgium
2. “Towards interoperability for European public services**”,** IP/10/1734, 16.12.2010, Brussels, Belgium
3. “Towards interoperability for European public services”, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions , COM(2010) 744 final, 16.12.2010, Brussels, Belgium
4. Ministerial Declaration, 29.11.2001, Brussels, Belgium
5. Presidency Conclusions, Lisbon European Council, 23-24.03.2000
6. “eEurope 2002: An Information Society For All”, Action Plan prepared by the Council and the European Commission for the Feira European Council 19-20 June 2000, 14.06.200, Brussels, Belgium
7. Ministerial Declaration, 07-08.07.2003, Como, Italy
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