

SEVENTH FRAMEWORK PROGRAMME



GREEK INTEROPERABILITY CENTER

Deliverable D5.2 Interoperability Barometer

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UPDATES TABLE

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10/02/2009	1.00	Interoperability Barometer_M12
15/02/2010	2.00	Interoperability Barometer_M24

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EXECUTIVE SUMMARY

In the context that Interoperability is the key needed element for business and governments in the new electronic landscape; the project has set the following goals:

- The creation of a national research pole of interoperability which will cooperate with enterprises, governmental organizations and research centres in Greece, in order to achieve high quality research results in the area of Interoperability.
- The active interaction with other relevant organisations and research centres, at Regional, European and International level, so as both to gain needed experience and know-how, but also to communicate results and assist neighbouring countries.
- The contribution to policy making and standardisation in Greece and the neighbouring region, thus assisting the implementation of European Policies and interoperability – related initiatives, such as the e-Government Interoperability Framework (eGIF).
- The active dissemination of research results towards the scientific and business community in Greece, in the neighbouring countries and internationally.

More specifically, recognizing the importance of aligning national and regional research priorities to international guidelines and serving the purpose of bringing together research centres from different geographic regions of Greece as well as the Balkans and Eastern Europe, so as to form a research pole in the domain of Interoperability and to create an environment of consensus and collaboration, the Greek Interoperability Centre proceeds in a series of actions including the issuing of a periodical report of Key Performance Indicators (KPIs) on interoperability-related factors.

For the second version of the Barometer, GIC intends to focus on a purely interoperability based approach, highlighting the status of interoperability indicators in the countries of the target region. Being the second version of the D5.2 series, the current deliverable presents the amendments applied to the conceptual framework and the methodology adopted within the frame of the Interoperability Barometer and exposes the findings of the study performed for a set of countries, including Bulgaria, Croatia, Cyprus, Greece and Hungary. The Interoperability Barometer is a mechanism that is established that will grow and develop with the collaboration of the centre's partners in the region.

The document is divided into the following chapters:

- Chapter 1: Introduction
 - Purpose
- Chapter 2: Methodology
 - Conceptual Framework
 - Countries Monitored
 - Interoperability Indicators
 - Interoperability Factsheet Template
 - Sources
 - Interoperability Maturity Model
 - Updating Mechanism
- Chapter 3: Interoperability Factsheets
 - Bulgaria
 - Croatia
 - Cyprus

- Greece
- Hungary
- Annex I – General Indicators
- Annex II: Interoperability Horizontal Issues
- Annex III: References

1. Introduction

1.1 Purpose

Recognizing the importance of aligning national and regional research priorities to international guidelines and serving the purpose of bringing together research centres from different geographic regions of Greece as well as the Balkans and Eastern Europe, so as to form a research pole in the domain of Interoperability and to create an environment of consensus and collaboration, the Greek Interoperability Centre is carrying out a series of actions including the issuing of a periodical report of Key Performance Indicators (KPIs) on interoperability-related factors.

Under the title “Interoperability Barometer”, the report in question consists of a series of indicators on interoperability-related factors and activities, (interoperability strategies and frameworks, interoperability-related projects and practices, e-government, e-business etc.) and aims at providing up-to-date, reliable information with regard to the status of Interoperability at local and regional level, i.e. in the countries of Eastern Europe and the Balkans which are found within the range of influence of the Greek Interoperability Centre.

The second version of this deliverable, which constitutes an update of the D5.2 series, presents the conceptual framework related to the Interoperability Barometer, reporting also the amendments applied to the methodology adopted in comparison to the previous version and exposes the findings of the study performed for a set of countries, including Bulgaria, Croatia, Cyprus, Greece and Hungary. As the work carried out within the frame of the Interoperability Barometer is a continuous process, updated versions of the latter covering more countries, are going to be made available progressively through the G.I.C. website. A final version of the Interoperability Barometer is to be submitted for review to the EC at the end of M36.

2. Methodology

2.1 Conceptual Framework

The purpose of the Interoperability Barometer is to provide a generic view of the status of Interoperability at local and regional level through the use of a series of metrics on interoperability-related factors. Contrary to the previous version, which covered a broader “e-scope”, justified by the selection and presentation of indicators with regard to ICT growth, e-government, e-business, e-commerce, broadband penetration, internet usage etc., the current (second) version of the Interoperability Barometer focuses strictly on interoperability-related metrics.

These metrics include qualities, such as the existence of a national interoperability strategy/framework as well as indications e.g. on the number of interoperability-related projects or cases with a good practice label implemented by a country, being thus both qualitative and quantitative. In fact, the updated version of the Interoperability Barometer is structured in six thematic areas, namely:

- I. Interoperability as a strategic goal
- II. National Interoperability Frameworks
- III. Interoperability Projects and Activities
- IV. National Interoperability Practices
- V. e-Government Interoperability
- VI. e-Business Interoperability

A detailed presentation of these categories along with a description of the sub-indicators involved in each one of them may be found in section 2.3.

At this point attention should be drawn to the fact, that certain metrics incorporated in the first version of the Interoperability Barometer (Information Society indicators, EC e-government benchmark, other international benchmarks) have been maintained in the current version as well, since they have been considered to provide a wider view of a country’s performance as an Information Society and allow a better understanding of the country’s propensity for interoperability projects’ and activities’ uptake and advancement. These metrics are aggregated in Annex I of the deliverable.

As far as the coverage of mechanism is concerned, in this second version of the deliverable, the Barometer has maintained its focus on the countries of Eastern Europe and the Balkans, justifying the regional scope of the Greek Interoperability Centre. However, as the number of countries included in the previous version has been considered to be too wide, and in order to better serve the objectives of the relevant work, the number of countries monitored under the Interoperability Barometer has been reduced to 21. The selected countries are presented in Section 2.2.

The current version of the Interoperability Barometer reports the interoperability findings in the countries of Bulgaria, Croatia, Cyprus, Greece and Hungary. The relevant reports are the first sample of the application of the updated interoperability barometer mechanism in the aforementioned countries. As the work carried out within the frame of the Interoperability Barometer is a continuous and dynamic process, similar reports are going to be produced progressively for all countries monitored and be made available through the G.I.C. website.

Fuelled by the exploration, study and processing of interoperability-related information from various sources, the continuous process of updating the Interoperability Barometer will also be triggered from now on by the contributions of collaborating organizations: the Greek Interoperability Centre is currently contacting its network of collaborating organizations as well as other potential partners with the aim of establishing a network of reliable contact persons in the countries monitored that will contribute in the process of updating the Interoperability Barometer in terms of improving its structure, providing valuable information and validating the content of the resulting reports.

2.2 Countries Monitored

The region that is of interest to the Interoperability Barometer includes most of the countries of Eastern Europe and the Balkans. Table 1 summarizes the countries monitored in the frame of the Interoperability Barometer.

Table 1: Countries Monitored

Interoperability Barometer Countries			
1. Albania	7. Estonia	13. Malta	19. Slovakia
2. Bosnia and Herzegovina	8. F.Y.R.O.M.	14. Montenegro	20. Slovenia
3. Bulgaria	9. Greece	15. Moldova	21. Turkey
4. Croatia	10. Hungary	16. Poland	
5. Cyprus	11. Latvia	17. Romania	
6. Czech Republic	12. Lithuania	18. Serbia	

2.3 Interoperability Indicators

This section presents the list of indicators composing the Interoperability Barometer, classified in six thematic categories. Brief descriptions of the indicators (and potential range of values) are provided if necessary.

I. *Interoperability as a strategic goal*

- **Strategic Priority on Interoperability**

Values: Yes/No/Unknown (and justification).

This qualitative indicator examines whether Interoperability is recognized as a strategic priority by a country. In case interoperability is included as a strategic goal or priority in the national e-Government, Interoperability, local e-Government, Digital Planning, IT or Information Society (etc.) strategy, the indicator is filled in with the value “Yes”; otherwise with the value “No”. In case there is no relevant information, the indicator is granted the value “Unknown”. A suitable justification is also provided depending on the case.

- **National Interoperability Strategy Status**

Values: Not planned yet/Planned/Under development/Published/Unknown.

This indicator investigates the status of a National Interoperability Strategy. The latter may be absent, and thus “Not planned yet”, “Planned”, “Under development” or already “Published”. In case no information is available, the National Interoperability Status is attributed the value “Unknown”.

II. *National Interoperability Frameworks*

- **National Interoperability Framework Status**

National Interoperability Frameworks (NIFs) prove that a country recognizes the importance of interoperability and provide generic recommendations as well as standards with regard to organizational, semantic and technical aspects of interoperability. This indicator examines the status of a National Interoperability Framework, collecting information on a series of relevant aspects, namely:

- **Status**
Values: Not planned yet/Planned/Under development/ Published/Unknown.
- **Title of NIF** (if published, under development or planned)
- **Version** (if published)
- **Release date** (if published)
- **Focus/Scope** (if published, under development or planned)
Values: Governance (G) / Conception (C) / Implementation (I) / Operation (O), and/or their possible combinations or Unknown
- **Audience** (if published, under development or planned)
Values: Government sector / Business sector, and/or their combination or Unknown.
- **Responsible Agency** (if known)

Information on most aspects of this indicator derives from the Final report of the “National Interoperability Frameworks Observatory – NIFO” project [1].

- **European Interoperability Framework Incorporation Status within National Interoperability Frameworks**

Values: Low/Moderate/High/Unknown.

This qualitative metric provides an indication of the level of importance and incorporation of the European Interoperability Framework (EIF), published by the IDABC (“Interoperable Delivery of European e-Government Services to Public Administrations, Businesses and Citizens”) initiative within National Interoperability Frameworks.

The idea is that, in the diversified forest of interoperability frameworks that have been produced as a result of the diverse needs and studies of different nations and organizations, cross-national interoperability and collaboration is not only a challenge in terms of information system interoperability but also a challenge in the way interoperability frameworks are compatible with each other, and can thereby serve as a vehicle for communication between the involved parties in cross-national interoperability collaborations. As a result, this indicator uses the EIF as a reference point and measures the compatibility of National Interoperability Frameworks with the latter.

III. Interoperability Projects and Activities

- **National Interoperability-related Activity**

Values:

- Non-existent: 0 projects
- Low/limited: 1-5 projects

- Moderate: 6-20 projects
- High: over 20 projects

An indication of the National Interoperability-related Activity of a country is given with regard to the number of interoperability-related projects funded from national resources. The latter is measured in a qualitative four level scale that includes the levels “Non-existent”, “Low/limited”, “Moderate” and “High”. A quite detailed but non-exhaustive list of national interoperability-related projects is also provided.

- **EU Interoperability Research Involvement**

Values:

- Non-existent: 0 projects
- Low/limited: 1-5 projects
- Moderate: 6-20 projects
- High: over 20 projects

Similarly, the EU Interoperability Research Involvement of a country is estimated in terms of the number of EU-funded interoperability-related projects in which the latter participates. The same four level qualitative scale is used in this case as well, while an indicative list of EU-funded projects is also included.

IV. National Interoperability Practices

- **Number of Interoperability Cases with a Good Practice label**

Values:

- No cases at all: 0 cases
- Low: 1-5 cases
- Medium: 6-20 cases
- High: over 20 cases

The metric in question provides an indication of the number of interoperability cases with a good practice label that have been implemented by a country. These are projects and other activities that have resulted in the development of flexible and reconfigurable IOP solutions with a number of articulated benefits, patterns and components that may be reused and exploited in other activities within the country or in other countries as well, for educational and/or benchmarking purposes. This indicator is particularly important as it reveals the country’s progress towards the achievement of interoperability as a result of the initiatives and activities undertaken.

Information on this indicator derives from the descriptions of real life cases submitted on the ePractice.eu portal and is actually based on the “Good Practice Label” award that may be granted to the latter by the ePractice community.

- **Best Interoperability Practice**

In the frame of this indicator, one interoperability case with a good practice label is selected as the most important one and described with regard to the following aspects:

- **Title and Short Description**

- **Status**
Values: Pilot application
Operational since...
Launched in...
etc.

- **IOP aspects covered**
Values: Technical
Semantic
Organisational
Legal
Standardization
Assessment
Training
Subcategories of the above
and/or their combinations according to the taxonomy of interoperability horizontal issues, presented in Annex II of the deliverable.

- **Impact**
Brief description of Benefits, Reusable Components, Patterns and Lessons Learnt from the particular IOP case.

V. *e-Government Interoperability*

▪ **Interoperability Level of core e-Government services to citizens**

This indicator measures the interoperability level of core e-Government services to citizens. “Core” covers the 12 public services most frequently used by households/citizens, according to Capgemini [22]. The indicator is expressed as the percentage of the 12 basic services which are provided in the 4th or 5th stage of sophistication maturity, i.e. which are fully available online.

▪ **Interoperability Level of core e-Government services to businesses**

Similarly, this indicator measures the interoperability level of core e-Government services to businesses. In this case, “core” covers the 8 public services most frequently used by businesses. The percentages for both indicators are calculated using information on the sophistication stage of e-Government services, included in the eGovernment factsheets, available through the ePractice.eu portal.

▪ **Connected Government Status**

The term “Connected Government” is used in the e-Government Survey of the United Nations [23] within the frame of the Web Measure Index to describe the situation in which governments transform themselves into a connected entity that responds to the needs of its citizens by developing an integrated back office infrastructure. In this context, the indicator “Connected Government Status” expresses the percentage of services, which are provided in Stage V “Connected”, based on the information on Service Delivery by Stages 2008, included in the e-Government Survey as well.

VI. *e-Business Interoperability*

▪ **Intra-organizational Business Processes Integration Level**

This metric measures the intra-organisational business process integration level as the percentage of enterprises having IT systems for orders and purchases which link to internal IT systems (re-ordering, invoicing, payment, managing production, logistics or service operations). All enterprises with 10 or more persons are included (without financial sector). The information used for this metric derives from Eurostat, the Statistical Office of the European Communities [24]. The year of the data is also provided.

- **Cross-organization Integration Level**

The cross-organization integration level is expressed as the percentage of enterprises whose business processes are automatically linked to those of their suppliers and/or customers. All enterprises with 10 or more persons employed are included (without financial sector). The information used derives from Eurostat [24]. The year of the data is also provided.

- **Cross-organization Application-to-Application Integration Level**

The cross-organization application-to-application integration level is estimated as the percentage of enterprises whose business processes are automatically linked to those of their suppliers and/or customers. All enterprises with 10 or more persons employed are included (without financial sector). The information used derives from Eurostat [24]. The year of the data is also provided.

- **e-Invoicing Status**

Considering e-Invoicing as another aspect of e-Business Interoperability, this metric aggregates the following data:

- Percentage of companies sending e-invoices
- Percentage of companies receiving e-invoices from suppliers
- Average share of sent e-invoices (as % of total invoices)
- Average share of received e-invoices (as % of total invoices)
- Average share of turnover stemming from e-invoices (as % of total turnover)

The information used to fill-in this indicator derives from the Table Report, “e-Business Survey 2006” of the European e-Business Market Watch [25]. The year of the data is also provided.

- **B2B Data Standards Usage**

This indicator examines the B2B data standards usage measuring the percentage of companies that use:

- ... EDI-based standards:
- ... XML-based standards:
- ... proprietary standards:
- ... other technical standards:

The source of the relevant information is the European e-Business Market Watch [25]. The year of the data is also provided.

- **Interoperability Awareness**

Interoperability awareness is examined in terms of the percentage of companies saying that interoperability is important for e-business ...

- ... within their sector:
- ... between sectors:
- ... for producing or providing products and service

The source of the relevant information is the European e-Business Market Watch [25]. The year of the data is also provided.

The information collected within the frame of the Interoperability Barometer may be used to outline the necessary actions and measures that need to be taken in each country so that higher benefits can be achieved.

2.4 Interoperability Factsheet Template

This section presents the Interoperability Factsheet template, i.e. the scheme for the collection of information on the selected interoperability indicators. The template maintains the classification in the aforementioned six thematic categories.

Table 2: Interoperability Factsheet Template

Interoperability Factsheet – Country	
I. Interoperability as a strategic goal	
Strategic Priority on Interoperability and justification	<u>Values:</u> Yes/No/Unknown
National Interoperability Strategy Status	<u>Values:</u> - Not planned yet - Planned - Under development - Published - Unknown
II. National Interoperability Frameworks	
National Interoperability Framework Status	
<i>Title:</i>	(If published, under development or planned)
<i>Version:</i>	(If published)
<i>Release date:</i>	(If published)
<i>Focus/Scope:</i>	(If published, under development or planned) <u>Values:</u> - G = Governance - C = Conception - I = Implementation - O = Operation, and/or their possible combinations - Unknown
<i>Audience:</i>	(If published, under development or planned) <u>Values:</u> - Government sector - Business sector and/or their combination - Unknown
<i>Status:</i>	<u>Values:</u> - Not planned yet - Planned - Under development - Published - Unknown
<i>Responsible Agency:</i>	If known
European Interoperability Framework Incorporation Status within National Interoperability Frameworks	
<u>Values:</u> - Low - Moderate - High - Unknown	
III. Interoperability Projects and Activities	
National Interoperability-related Activity: Number of interoperability-related projects funded from national resources	

<p>Values:</p> <ul style="list-style-type: none"> - Non-existent: 0 projects - Low/limited: 1-5 projects - Moderate: 6-20 projects - High: 20++ projects 	
<p>EU Interoperability Research Involvement: Number of EU-funded interoperability-related projects</p>	
<p>Values:</p> <ul style="list-style-type: none"> - Non-existent: 0 projects - Low/limited: 1-5 projects - Moderate: 6-20 projects - High: 20++ projects 	
<p>IV. National Interoperability Practices</p>	
<p>Number of Interoperability Cases with Good Practice label</p>	
<p>Values:</p> <ul style="list-style-type: none"> - No cases at all: 0 cases - Low: 1-5 cases - Medium: 6-20 cases - High: 20++ cases 	
<p>Best Interoperability Practice</p>	
<p><i>Title and Short Description:</i></p>	
<p><i>Status:</i></p>	
<p>Values:</p> <ul style="list-style-type: none"> - Pilot application - Operational since... - Launched in... <p>etc.</p>	
<p><i>IOP aspects covered:</i></p>	
<p>Values:</p> <ul style="list-style-type: none"> - Technical - Semantic - Organizational - Legal - Standardization - Assessment - Training - Subcategories of the above <p>and/or their combinations according to the taxonomy of interoperability horizontal issues, presented in Annex II of the deliverable.</p>	
<p><i>Impact:</i></p> <p>Brief description of Benefits, Reusable Components, Patterns and Lessons Learnt from the particular IOP case.</p>	
<p>V. e-Government Interoperability</p>	
<p>Interoperability Level of core e-Government services to citizens</p>	<p>Percentage of the 12 core services to citizens provided in the 4th or 5th sophistication stage.</p> <ul style="list-style-type: none"> - 0: stages 0-3 - 1: stages 4,5
<p>Interoperability Level of core e-Government services to businesses</p>	<p>Percentage of the 8 core services to businesses provided in the 4th or 5th sophistication stage.</p> <ul style="list-style-type: none"> - 0: stages 0-3 - 1: stages 4,5
<p>Connected Government Status</p>	<p>Percentage of services provided in Stage V</p>

		“Connected” within the Web Measure Index.
VI. e-Business Interoperability		
Intra-organizational Business Processes Integration Level		Percentage of enterprises having IT systems for orders and purchases which link to internal IT systems (re-ordering, invoicing, payment, managing production, logistics or service operations) All enterprises with 10 or more persons employed are included (without financial sector). (and reference year)
Cross-organization Integration Level		Percentage of enterprises having IT systems for orders and purchases which link to IT systems of suppliers or customers outside the enterprise group All enterprises with 10 or more persons employed are included (without financial sector). (and reference year)
Cross-organization Application-to-Application Integration Level		Percentage of enterprises whose business processes are automatically linked to those of their suppliers and/or customers All enterprises with 10 or more persons employed are included (without financial sector). (and reference year)
e-Invoicing Status:	Percentage of companies sending e-invoices: Percentage of companies receiving e-invoices from suppliers: Average share of sent e-invoices (as % of total invoices): Average share of received e-invoices (as % of total invoices): Average share of turnover stemming from e-invoices (as % of total turnover):	
B2B Data Standards Usage (“Percentage of companies using...”)	... EDI-based standards: ... XML-based standards: ... proprietary standards: ... other technical standards:	
Interoperability Awareness- (“Percentage of companies saying that interoperability is important for e-business ...”)	... within their sector: ... between sectors: ... for producing or providing products and service	

2.5 Sources

The present version of the Interoperability Barometer has been structured and based on publicly available information. Although the material used (reports, portals, surveys etc) has already been outlined in the description of the relevant indicators, an overview of the Interoperability Barometer's information sources is presented here as well:

- Gartner, National Interoperability Frameworks Observatory project – Final report: “A Report for European Commission Directorate General for Informatics”, Version 130, May 2009, available at <http://ec.europa.eu/idabc/en/document/7796>.
- ePractice.eu, eGovernment Factsheets, available at <http://www.epractice.eu/en/factsheets/>.
- ePractice.eu, Cases at <http://www.epractice.eu/en/cases/>.
- Capgemini, eGovernment Benchmark Survey 2009: “Smarter, Faster, Better eGovernment”, 8th Benchmark Measurement, November 2009, available at http://ec.europa.eu/information_society/eeurope/i2010/docs/benchmarking/egov_benchmark_2009.pdf.
- United Nations, “eGovernment Survey 2008: From eGovernment to Connected Governance”, United Nations, New York 2008, available at <http://unpan1.un.org/intradoc/groups/public/documents/UN/UNPAN028607.pdf>
- Eurostat: Statistical Office of the European Communities, Information Society: Structural Indicators, available at <http://epp.eurostat.ec.europa.eu/>.
- The European e-Business Market Watch, “Table Report: e-Business Survey 2006”, Version 2.1, July 2006, available at <http://www.ebusiness-watch.org/>.

2.6 Interoperability Maturity Model

The Interoperability Barometer mechanism will be complemented at a later stage by an Interoperability Maturity Model, consisting of a series of levels that will describe the evolvement of a country from a stage of lack of awareness and/or planning on interoperability to a stage of interoperability activities and projects being value-adding and resulting in tangible and measurable benefits. The model will analyze the different characteristics related to each level and will draw connections between each stage of interoperability maturity and potential actions and measures to be taken in order to advance the status of interoperability per country.

The collection of information on the indicators listed above will serve thus the classification of the countries monitored in a series of interoperability maturity levels and the suggestion, depending on the case, of the activities that each country should undertake in order to move upwards in the hierarchy outlined.

2.7 Updating Mechanism

As already indicated, the updating of the Interoperability Barometer constitutes a continuous and dynamic procedure, fuelled by the exploration, study and processing of interoperability-related information as well as by the contributions of collaborating organizations. In this context, planned activities include:

- the proliferation (if possible) of the indicators adopted
- the development of an Interoperability Maturity Model
- the creation of interoperability reports for more countries
- the development of questionnaires that will be dispatched to G.I.C. collaborating organizations and more specifically to the network of contact persons to be established for this purpose with the perspective of gathering information.
- the validation of the resulting reports with the support once again of the G.I.C. network of contact points.

Moreover, in order to enhance the efficiency and effectiveness of the Interoperability Barometer mechanism, as well as to ensure the reliability of the information collected, G.I.C. considers the development of a web-based tool. Hosted at the G.I.C. web-site, such a tool will be accessible by collaborating entities for the purpose of filling in and/or editing interoperability-related information on the country they represent, and will potentially enhance the collaborative spirit that characterizes the activities carried out by the Greek Interoperability Centre.

3. Interoperability Factsheets

3.1 Bulgaria

Interoperability Factsheet - Bulgaria	
I. Interoperability as a strategic goal	
Strategic Priority on Interoperability	Yes
<p>General interoperability guidelines are defined in the Bulgarian National Interoperability Framework for Governmental information Systems (6/2006) and the Ordinance on the General Requirements for Interoperability and Information Security (11/2008) [1].</p> <p>There is also the strategic goal of developing centralised e-government systems (provision of a centralised integrated information environment for public services, delivery of centralised services by proposing standardised solutions; activities related to the security of centralised information and systems). Such tasks imply drawing up uniform standards to be used in the communications and exchange of data [2], [22].</p>	
National Interoperability Strategy Status	Unknown
II. National Interoperability Frameworks	
National Interoperability Framework Status	Published
<i>Title:</i>	Bulgarian National Interoperability Framework for Governmental Information Systems [1].
<i>Version:</i>	-
<i>Release date:</i>	28 June 2006
<i>Focus/Scope:</i>	Unknown
<i>Audience:</i>	Government
<i>Status:</i>	Published
<i>Responsible Agency:</i>	Ministry of State Administration and Administrative Reform http://www.mdaar.government.bg/emanagement.php
European Interoperability Framework Incorporation Status within National Interoperability Frameworks	
High. The Bulgarian NIF has been developed in compliance with the “European Interoperability Framework for pan-European e-Government Services” - version 1.0, published in November 2004.	
III. Interoperability Projects and Activities	
National Interoperability-related Activity: Number of interoperability-related projects funded from national resources	
Moderate	
Indicative projects:	
<ul style="list-style-type: none"> ▪ eGovernment portal providing a single entry point to information and transactional public services organized according to life-events [2], [22]. ▪ “Prototype of Register of Standards for eGovernment”, comprising 180 horizontal standards and implemented by the working group “Application of standards related to eGovernment” [2]. ▪ ePayment Gateway – “Elaboration of an environment ensuring electronic payments in the process of providing online administrative services” project – to provide a single web environment enabling citizens and legal entities to settle online their payments to the central, regional and local Administration (as part of the integrated eGovernment system - https://pay.egov.bg/main/) [2]. ▪ National Health Portal (www.zdravenportal.bg), integrated with electronic personal ambulatory books (eLAKs) and providing up-to-date and accurate health information, registers of all health professionals, hospitals, pharmacies, medical services, health forms and others. It integrates the healthcare sector through Internet and enables the citizens and health professionals to exchange information effectively regardless of their physical location [2]. ▪ Pilot project of RRObserver, an application for monitoring the progress of various regulatory procedures, including licences, registrations, permits etc. in the town of Sopot. The application integrates seamlessly existing document management systems, upgrades them and uses their data 	

- to check whether administrations are completing procedures within the statutory deadlines [2], [47].
- National Network of the Public Administration (NAMDA) [2].
- Web-based Public Procurement Register, covering the entire lifecycle of a public procurement procedure (from the preliminary notice to the announcement of the contract award) and being constantly upgraded with the most advanced information and communication technologies [2].
- Online register for company eRegistration (<http://www.brra.bg/>) [2].

EU Interoperability Research Involvement: Number of EU-funded interoperability-related projects

Low

Indicative projects:

- AsIsKnown (A Semantic-based KNOWledge flow system for the European home textiles industry) project to promote collaboration within the home textiles industry (<http://www.asisknown.org/>) [45].
- NETC@RDS project on the deployment of an online service for the “electronification” of the European Health Insurance Card (EHIC) in 16 EFTA/EU countries and a trans-European interoperable infrastructure (<http://www.netcards-project.com>) [46].

IV. National Interoperability Practices

Number of Interoperability Cases with Good Practice label

No cases at all.

Best Interoperability Practice

Title and Short Description:

-

Status:

-

IOP aspects covered:

-

Impact:

-

V. e-Government Interoperability

Interoperability Level of core e-Government services to citizens	25% (3/12)
Interoperability Level of core e-Government services to businesses	0% (0/8)
Connected Government Status	0% (0/145)

VI. e-Business Interoperability

Intra-organizational Business Processes Integration Level	17% (2007)
Cross-organization Integration Level	5% (2007)
Cross-organization Application-to-Application Integration Level	14% (2008)
e-Invoicing Status:	Percentage of companies sending e-invoices: Not Available
	Percentage of companies receiving e-invoices from suppliers: Not Available
	Average share of sent e-invoices (as % of total invoices): Not Available
	Average share of received e-invoices (as % of total invoices): Not Available
	Average share of turnover stemming from e-invoices (as % of total turnover): Not Available
B2B Data Standards Usage (“Percentage of companies using...”)	... EDI-based standards: Not Available
	... XML-based standards: Not Available
	... proprietary standards: Not Available
	... other technical standards: Not Available
Interoperability Awareness-	... within their sector: Not Available
	... between sectors: Not Available

(“Percentage of companies saying that interoperability is important for e-business ...”) ... for producing or providing products and service

Not Available

3.2 Croatia

Interoperability Factsheet - Croatia	
I. Interoperability as a strategic goal	
Strategic Priority on Interoperability	Yes
Interoperability stands as a key area in the eCroatia Programme, which defines the main directions of the Croatian eGovernment Strategy [3].	
National Interoperability Strategy Status	Unknown
II. National Interoperability Frameworks	
National Interoperability Framework Status	Under development
<i>Title:</i>	Croatian framework for electronic government interoperability [1].
<i>Version:</i>	N/A
<i>Release date:</i>	N/A
<i>Focus/Scope:</i>	Unknown
<i>Audience:</i>	Government
<i>Status:</i>	Under development
<i>Responsible Agency:</i>	Central State Administrative Office for e-Croatia http://www.e-hrvatska.hr/sdu/en/e-hrv.html
European Interoperability Framework Incorporation Status within National Interoperability Frameworks	
Unknown	
III. Interoperability Projects and Activities	
National Interoperability-related Activity: Number of interoperability-related projects funded from national resources	
Moderate	
Indicative projects:	
<ul style="list-style-type: none"> ▪ Project of assigning a personal identification number (OIB) to every person as a unique and obligatory identifier in the whole Croatian public administration system and implementing the appropriate, efficient interoperability system and communication infrastructure. (http://www.oib.hr/) [53]. ▪ CROinvest internet portal of the Trade and Investment Promotion Agency of the Republic of Croatia, designed to gather all the necessary data regarding investment climate in the country from multiple sources with different underlying platforms and technologies and to serve as a central source of information for domestic and foreign investors (http://www.croinvest.org/) [54]. ▪ Project on the establishment of the central government portal “Moja uprava”, providing information on eGovernment services, intended for citizens and entrepreneurship and evolving into one point of contact between Government and citizens (http://www.mojauprava.hr) [3], [57]. ▪ eSpis project (ICMS – Integrated Court Management System) to enable the management of court cases, cover all business operations and needs of the judicial system and to improve its efficiency) [3]. ▪ Project on the establishment of an integrated information system of primary healthcare (integrating practices, laboratories and pharmacies), with the aim of providing better quality of service to citizens and higher level of transparency [3]. ▪ ARHiNET project, to establish a unique national integrated information and documentation system that comprises all processes concerning the activities of archival institutions and facilitates data exchange among the latter, and to enable standardisation and increasing quality of provision and services in archives. (http://arhinet.arhiv.hr/) [56]. ▪ HITRONet, Information-Communication Network for State Administration providing the infrastructure for further development of services and enabling connection and better communication among the bodies of public administration transparency [3]. 	

- HITRO.HR project to interconnect all state-administrative IT resources and to enable one-stop-shop access to information and public administration services through a variety of communication channels (on-line, mobile, phone and face-to-face), (<http://www.hitro.hr>). Provided services: Company registration, e-Craft, e-VAT, e-REGOS, e-Cadastre, e-Pension, e-Health. [3], [55].
- eCREW project: Maritime integrated information system (<http://ecrew.pomorstvo.hr/>) [3].
- Eurovoc thesaurus relating 6 500 concepts to the same number of concepts in 20 languages of the European Union at the level of legislative practice of the European Parliament [3].
- Multipurpose Spatial Information System, linking basic spatial databases, maintained by the Croatian State Geodetic Directorate, into a unique information system [3].
- Pilot project of the integrated authentication and authorisation system [22].

EU Interoperability Research Involvement: Number of EU-funded interoperability-related projects

Low

Indicative projects:

- CALLIOPE (“CALL for InterOPERability”) project, aiming to promote an effective uptake of and advance eHealth interoperability (<http://www.calliope-network.eu/>) [34].

IV. National Interoperability Practices

Number of Interoperability Cases with Good Practice label

Low

- HITRO.HR service, interconnecting all state-administrative IT resources and enabling one-stop-shop access to information and public administration services through a variety of communication channels (on-line, mobile, phone and face-to-face), (<http://www.hitro.hr>) [3], [55].
- ARHiNET, the Croatian archival service, based on an integrated information and documentation system of data exchange among the institutions that keep archival material and enabling rationalization and standardization of business processes in Croatian archives (<http://arhinet.arhiv.hr/>) [56].

Best Interoperability Practice

Title and Short Description:

HITRO.HR service interconnecting all state-administrative IT resources and enabling one-stop-shop access to information and public administration services through a variety of communication channels (on-line, mobile, phone and face-to-face), (<http://www.hitro.hr>) [3], [55].

Status:

Operational since May 2005.

IOP aspects covered:

- Interoperability Standards
- Service-oriented Architectures
- Business Process Management (Modelling, Reengineering and Integration)
- Information Exchange
- Service Portals
- Authentication and Security (Authentication, Identification and Encryption)
- Legal and Business Rules
- Business Models Best Practices

Impact:

Benefits - Reusable Components – Patterns:

- One-stop-shop based services in the processes of starting a business (company, craft) and filing on line applications for the health and pension insurance and taxes. On the HITRO.HR counters (currently on 61 locations) it is possible to establish a Limited Liability Company or a Craft Business in an easier and quicker manner. Prior to launching HITRO.HR the process of registration was at least 40 days and 9 institutions were included. HITRO.HR decreased whole process just to 24 hours and 3 relevant institutions, fully electronically connected. HITRO.HR also provides e-services that are available from office or home, 24 hours/day. Using FINA e-card and digital signature, clients have access to different services relevant for the business operations as e-Regos, e-Cadastre, e-Pension, e-

- Craft and e-Health. Significant savings in time and finances for business subjects have been made.
- HITRO.HR is a link for the clients, and collects/handles client’s documents as a channel between the client and State bodies.
- Public administration services are provided through a variety of communication channels (on-line, mobile, phone and face-to-face).
- HITRO.HR has an orientation towards the clients’ individual needs and the transparency of procedures (the client has an insight in every stage of the procedure and is aware of the status of his request during the whole process) and puts clients ahead of procedures.
- Through HITRO.HR it was the first time ever in Croatia that an “administrative body” calls upon client and addresses the client by phone, e-mail, sms etc. in order to give message about the status of their applications as well as the notice if there is any extra documentation needed for the process.
- At the Corporate Registers Forum 2009 in the “World class Indicators” report presented by the Companies office of UK HITRO.HR service was pronounced a “top performer” in the area of company registration, usage and application of electronic solutions among 42 countries from Europe, Africa, Asia and Oceania.
- Removal of many administrative barriers, time savings through faster procedures, less personal visit to different institutions, less paperwork, availability of all information/forms/payments at one place, clear and understandable procedures, transparency and professionalism of the employees are further benefits that have resulted

Lessons Learnt – Success Factors:

- Prior to starting a radical administration reform, and as early as possible, it is necessary to ensure as wide as possible consensus on the basic principles of the reform within the Government and competent institutions. Sustained vision of the reform will only be implemented if this consensus is achieved at the very beginning.
- Since reform involves competencies of several ministries, it is necessary for the Government to establish an inter-ministerial body to follow up and coordinate the overall reform and to ensure consistency in the regulations and in the implementation of the Action plan for the reform. This helps to ensure that Government departments avoid introducing duplicated or superfluous forms and/or contact points in the reform of the procedures. All involved will have the broader picture and the higher level of the interoperability would be introduced among stakeholders, hopefully resulting with integrated services across governmental bodies.
- There is definitely need to use IT and databases as much as possible for the transmission and authentication of information submitted and/or the exchange of information between public authorities. Within those reforms standards must be followed but not as a bottleneck for the use of new technologies, such as advanced digital signature use and the use of digital documents instead of paper ones, but as a “gate opener” to the new perspective of business solutions.
- Simplicity, open approach and adaptability should constitute the key factors of reform efforts. Simplicity so as to attract the general public into the use of new services, open approach to understanding the current needs of the public and to introducing new and innovative technologies and adaptability of new services so as to replace the old “procedures”.

V. e-Government Interoperability	
Interoperability Level of core e-Government services to citizens	8,3% (1/12)
Interoperability Level of core e-Government services to businesses	37,5% (3/8)
Connected Government Status	2,3% (3/129)
VI. e-Business Interoperability	
Intra-organizational Business Processes Integration Level	36% (2007)
Cross-organization Integration Level	12% (2007)
Cross-organization Application-to-Application Integration Level	36% (2008)

e-Invoicing Status:	Percentage of companies sending e-invoices:	Not Available
	Percentage of companies receiving e-invoices from suppliers:	Not Available
	Average share of sent e-invoices (as % of total invoices):	Not Available
	Average share of received e-invoices (as % of total invoices):	Not Available
	Average share of turnover stemming from e-invoices (as % of total turnover):	Not Available
B2B Data Standards Usage ("Percentage of companies using...")	... EDI-based standards:	Not Available
	... XML-based standards:	Not Available
	... proprietary standards:	Not Available
	... other technical standards:	Not Available
Interoperability Awareness- ("Percentage of companies saying that interoperability is important for e-business ...")	... within their sector:	Not Available
	... between sectors:	Not Available
	... for producing or providing products and service	Not Available

3.3 Cyprus

Interoperability Factsheet - Cyprus	
I. Interoperability as a strategic goal	
Strategic Priority on Interoperability	Yes
Within the scope of the project for the revision of the Cyprus eGovernment Strategy there is the plan of preparing a National Interoperability Framework based on the guidance provided by the European Interoperability Framework (EIF) [4].	
National Interoperability Strategy Status	Unknown
II. National Interoperability Frameworks	
National Interoperability Framework Status	Under development
<i>Title:</i>	-
<i>Version:</i>	N/A
<i>Release date:</i>	N/A
<i>Focus/Scope:</i>	Unknown
<i>Audience:</i>	Government
<i>Status:</i>	Under Development [1].
<i>Responsible Agency:</i>	Department of Information Technology Services, Ministry of Finance, http://www.mof.gov.cy/mof/dits/dits.nsf/
European Interoperability Framework Incorporation Status within National Interoperability Frameworks	
Envisaged to be high [4], since the National eGovernment Interoperability Framework will be prepared based on the guidance provided by the European Interoperability Framework.	
III. Interoperability Projects and Activities	
National Interoperability-related Activity: Number of interoperability-related projects funded from national resources	
Moderate	
Indicative projects:	
<ul style="list-style-type: none"> ▪ eProcurement System (ePS) project, to develop a secure and interoperable web-based application for procurement of competitions and announcement of award results (https://www.eprocurement.gov.cy/ceproc/home.do) [4], [42]. ▪ Citizen Service Centers project (as one-stop-shops for service delivery) [4]. ▪ e-Filing project to allow complete online company registration [4]. ▪ The Government Secure Gateway project for enabling e-government service delivery and G2G, G2B, G2C transactions in a secure and interoperable manner and connecting the government back-end information systems using open interoperability standards to ensure seamless integration with all agency services and technology platforms [4]. ▪ Government project on electronic identification (eID, smart cards) for cross-border seamless access to public services [4]. ▪ Project on the establishment of a single entry point for services and the set up of a relevant portal [4]. ▪ Integrated Health Care System project [4]. ▪ Government Data Network (GDN) to interconnect all government information systems/organizations and Government Internet Node as the gateway between government systems and the public network [4]. ▪ eOAS - eOffice Automation System to support enterprise-wide document management services as well as control of work-groups and work-flow [4]. 	
EU Interoperability Research Involvement: Number of EU-funded interoperability-related projects	
Low	
Indicative projects:	

- GENESIS (“Enterprise Application Interoperability via Internet-Integration for SMEs, Governmental Organisations and Intermediaries in the New European Union”) addressing the interoperability issues that hinder electronic transactions among enterprises and organizations today and focusing on the research, development and pilot application of the needed methodologies, infrastructure and software components that will allow the typical, usually small and medium European enterprise to conduct business transactions over the internet (<http://www.genesis-ist.eu>) [60].

IV. National Interoperability Practices

Number of Interoperability Cases with Good Practice label

Low

- eProcurement System (ePS) for conducting public procurement competitions in Cyprus using electronic means
(<https://www.eprocurement.gov.cy/ceproc/home.do>) [4], [42].
- eOAS: eOffice Automation System (service for government employees), a web-enabled, platform independent system to support enterprise-wide document management services as well as control of work-groups and work-flow
(<http://www.mof.gov.cy/mof/dits/dits.nsf>) [4], [43].

Best Interoperability Practice

Title and Short Description:

eProcurement System (ePS), a secure and interoperable web-based application providing advanced functionality for all procurement phases, comprising eRegistration, eNotification, ePreparation of Calls for Tenders, eTendering, eAwarding, eStatistics and eAuctions.
(<https://www.eprocurement.gov.cy/ceproc/home.do>) [4][42].

Status:

Operational since January 2009.

IOP aspects covered:

- Interoperability Standards
- Legal and Business Rules Modeling, Execution and Management.
- Security and Authentication
- Information Management

Impact:

Benefits - Reusable Components – Patterns:

- High quality of adherence to the legal environment: transparency, compliance and convergence with the EC directives.
- Interoperability: tools and services, based on Open Source Software (OSS) and use of Open Standards. Interface with EU Official Journal and the Cyprus Official Gazette. Support of UBL standard for e-Catalogues and e-Orders.
- State-of-the-Art technical infrastructure that enables equal treatment, non-discrimination, transparency and security and contains specialised security equipment and no single-point-of-failure.
- Increased productivity and reduction of required resources.
- Better management of information: data entry errors and repetition of information are reduced, providing highly detailed and easily accessible data through electronic documents, as well as advanced searching and auditing facilities. This will facilitate the expansion of management reporting, monitoring, financial analysis and forecasting capabilities.
- Transparency through wider market participation and easier access, increased competition levels and lower costs for public administrations.
- Faster procurement through better efficiency: the procurement cycle is reduced due to capability to re-use previous competition information, electronic completion of notices and automated evaluation.
- Reduction of off-contract buying: low-value purchases are possible to be achieved through Framework Agreements and e-Catalogues. All public sector purchases can be traced within the system.
- Transparency in monitoring public expenditure information: public can easily access and "have a say" in public sector purchases.
- Automated evaluation mechanism in the e-Awarding module, where tenders can be fully evaluated

- by the system provided that they comply with pre-defined tender templates.
- The system operates as a portal that can accommodate the needs of any CA, as such could be used by non-domestic CAs.
- NO geographic limitation as regards the use the system by EOs.

Lessons Learnt:

- The technical specifications for the project have been based to a large extent to the Functional Requirements on Public Procurement documents disseminated by the EC in 2004. As such, these documents have not only provided a good starting point for the specifications of the e-Procurement system in Cyprus, but also proved that similar initiatives by the EC can significantly assist Member States in designing ICT systems in line with EC Directives/Regulations.
- During the project, it has been confirmed that the majority of rules/regulations described in the EC Directives (2004/17/EC and 2004/18/EC regulating Public Procurement procedures in the European Countries) can be implemented in an ICT system that controls and guides users on the procedures/actions to be performed for conducting public procurement competitions.
- Furthermore, it has been made clear that in order for an electronic system to be fast and widely adopted by the public procurement community, effort should be dedicated in aspects related to change management, promotion and dissemination of results. These aspects play a major role for building trust and getting end-users (Contracting Authority users and Economic Operator users) familiarized to the concepts of electronic public procurement.

V. e-Government Interoperability		
Interoperability Level of core e-Government services to citizens		33,3% (4/12)
Interoperability Level of core e-Government services to businesses		50% (4/8)
Connected Government Status		1,4% (2/143)
VI. e-Business Interoperability		
Intra-organizational Business Processes Integration Level		44% (2007)
Cross-organization Integration Level		6% (2007)
Cross-organization Application-to-Application Integration Level		8% (2008)
e-Invoicing Status:	Percentage of companies sending e-invoices:	Not Available
	Percentage of companies receiving e-invoices from suppliers:	Not Available
	Average share of sent e-invoices (as % of total invoices):	Not Available
	Average share of received e-invoices (as % of total invoices):	Not Available
	Average share of turnover stemming from e-invoices (as % of total turnover):	Not Available
B2B Data Standards Usage ("Percentage of companies using...")	... EDI-based standards:	Not Available
	... XML-based standards:	Not Available
	... proprietary standards:	Not Available
	... other technical standards:	Not Available
Interoperability Awareness- ("Percentage of companies saying that interoperability is important for e-business ...")	... within their sector:	Not Available
	... between sectors:	Not Available
	... for producing or providing products and service	Not Available

3.4 Greece

Interoperability Factsheet - Greece	
I. Interoperability as a strategic goal	
Strategic Priority on Interoperability	Yes
The Greek eGovernment Interoperability Framework is part of the overall design of the Greek Public Administration aiming to provide eGovernment services to enterprises and citizens. It is the cornerstone of the Digital Strategy for the period 2006-2013, and it is also directly related to the objectives and guidelines of EU Policy 2010, European Information Society 2010. The Framework aims to support eGovernance at central, regional and local level and to achieve interoperability at the information systems level, processes and data by defining the standards, specifications and rules for the development and deployment of web-based front and back-office systems [11].	
National Interoperability Strategy Status	Not planned yet
II. National Interoperability Frameworks	
National Interoperability Framework Status	Published
<i>Title:</i>	Greek eGovernment Interoperability Framework http://www.e-gif.gov.gr/ [1].
<i>Version:</i>	v3.0
<i>Release date:</i>	January 2009
<i>Focus/Scope:</i>	- (C) Conception - (I) Implementation - (O) Operation The Framework defines standards, specifications and rules for the development and deployment of web-based front and back office systems for the Greek Public Administration at National and Local level. Although it refers to vision and strategy it is not a systematic approach. The conception, the implementation and the operation are analyzed adequately.
<i>Audience:</i>	Government
<i>Status:</i>	Published
<i>Responsible Agency:</i>	Greek Ministry of Interior, Public Administration and Decentralization - General Secretariat of Public Administration and Electronic Government http://www.gspa.gr/%286404224911726215%29/eCHome.asp?lang=1
European Interoperability Framework Incorporation Status within National Interoperability Frameworks	
High. The Greek Interoperability Framework is in conformance with the European Interoperability Framework (EIF).	
III. Interoperability Projects and Activities	
National Interoperability-related Activity: Number of interoperability-related projects funded from national resources	
Moderate Indicative projects:	
<ul style="list-style-type: none"> ▪ ERMIS project – Interoperability Infrastructure and National Portal of Public Administration [11]. ▪ National Citizens' Base Registry [11]. ▪ Project on the "Design and Implementation of a System for Automating the Administration, Archiving and Dissemination of Legislation to the broader Public" (E-Themis Online Legislation Portal http://www.e-themis.gov.gr/Portal/default.aspx?page=home) [11]. ▪ The National Cadastre project and portal aiming at the simplification of the real estate property transactions, enabling online submission of applications, electronic secure payments and transferring of documents [11]. ▪ "SYZEFXIS" project – the National Public Administration Network 	

(<http://www.syzefxis.gov.gr/Default.aspx?lang=2>), linking the information systems of more than 4000 public bodies and offering Public Key infrastructure services [11].

- The Hellenic Police Network (Police Online) connecting more than 1100 police departments and offering new electronic services to citizens [11].
- TAXISnet portal for online tax and customs services, including e-filing of VAT forms with payment through banking systems services, e-filing of Income Tax forms, personalized information for Income Tax assessment and e-delivery of tax certificates (<https://www.taxisnet.gr/>) [11], [61].
- Online issuing of criminal records in six major cities [11].
- The Management Information System of the Hellenic Selective Service offering information services, citizen guide, online submission of military service redemption applications and numerous other forms [11].
- The portal of the Supreme Court of Audit the information system of the Council of State allowing online follow up of cases by the litigants or the attorney with the use of passwords, online application for certificates, etc [11].
- GRNET project - Greek Research and Technology Network (<http://www.grnet.gr/default.asp?pid=27&la=2>), supporting the electronic interconnection of academic and research institutions among themselves as well as with relevant academic networks world-wide through research and education networks [11].

EU Interoperability Research Involvement: Number of EU-funded interoperability-related projects

Moderate

Indicative projects:

- SPOCS (“Simple Procedures Online for Cross-border Services”) project to remove the administrative barriers that European businesses face before offering their services abroad and ensure service and system interoperability (<http://www.eu-spocs.eu/>) [38].
- GENESIS (“Enterprise Application Interoperability via Internet-Integration for SMEs, Governmental Organisations and Intermediaries in the New European Union”) addressing the interoperability issues that hinder electronic transactions among enterprises and organizations today and focusing on the research, development and pilot application of the needed methodologies, infrastructure and software components that will allow the typical, usually small and medium European enterprise to conduct business transactions over the internet (<http://www.genesis-ist.eu>) [60].
- PEPPOL (Pan-European Public eProcurement On-Line) project (<http://www.peppol.eu/>) [12].
- FUSION (Business process fusion based on Semantically-enabled Service-oriented Business Applications) project aiming to promote efficient business collaboration and interconnection between enterprises (including SMEs) by developing a framework and innovative technologies for the semantic fusion of heterogeneous service-oriented business applications [58].
- INTEROP-NoE (Interoperability Research for Networked Enterprises Applications and Software - Network of Excellence) project focusing on the integration of main thematic components of interoperability research roadmaps, the development of new knowledge and the promotion of interoperability research on enterprise applications at a European level [59].
- NEXES (“Supporting Healthier and Independent Living for Chronic Patients and Elderly”) project, aiming to support the deployment of ICT-enabled integrated healthcare programs ensuring at the same time organizational interoperability among the actors involved [31].
- SAKE (“Semantic-enabled Agile Knowledge-based eGovernment”) project to facilitate knowledge management (knowledge personalization, proactivity and transferring as well as integration of structured and unstructured data) in the public sector (<http://www.sake-project.org/>) [32].
- SWEB (“Secure, interoperable cross-border m-services towards a trustful European cooperation with the non-EU member Western Balkan countries”) project to develop a secure, interoperable, open, affordable platform upon which secure cross border government services will be built (<http://www.sweb-project.org/>) [33].
- CALLIOPE (“CALL for InterOPERability”) project, aiming to promote an effective uptake of and advance eHealth interoperability (<http://www.calliope-network.eu/>) [34].
- Access-eGov (“Access to e-Government Services Employing Semantic Technologies”) project to develop and validate a platform for composition of government services into complex process definitions (covering life events/business episodes) enabling semantic interoperability of particular e-Government services (<http://www.access-egov.org/acegov/web/uk/index.jsp>) [35].

- EPSOS (“European Patients Smart Open Services”) project aiming to build and evaluate a service infrastructure demonstrating cross-border interoperability between Electronic Health Record Systems in Europe (<http://www.epsos.eu/>) [36].
- VIDE (“Visualize moDel drivEn programming”) project, focusing on the development of a Unified Modelling Language (UML)-compliant action language including visual notation, mainly suited to business applications (<http://www.vidе-ist.eu/>) [37].
- SemanticGov (“Providing Integrated Public Services to Citizens at the National and Pan-European level with the use of Emerging Semantic Web Technologies”) project to build the infrastructure necessary for enabling the offering of semantic web services by public administration in order to achieve among others interoperability amongst PA agencies both within a country as well as amongst countries (<http://www.semantic-gov.org/>) [39].
- COMMIUS (“COMMunity-based Interoperability Utility for SMEs”) to develop an innovative interoperability technology supporting new business models for the European SMEs (<http://www.commius.eu/>) [40].
- SELIS (“SEcure ELEctronic Invoicing Service”), a cross-border service for the secure exchange of eInvoices, based on an innovative architecture that adopts the most advanced standards for the secure provision of interoperable services (<http://selis.unipi.gr/selis/main/index.html>) [41].
- NETC@RDS project on the deployment of an online service for the “electronification” of the European Health Insurance Card (EHIC) in 16 EFTA/EU countries and a trans-European interoperable infrastructure (<http://www.netcards-project.com>) [46].
- eMARK project, to optimize the protection of trademarks through image-based searches of trademarks or industrial designs kept by Industrial Property offices to provide among others a new interoperability standard for the harmonization of Intellectual Property Office data collections (<http://emarks.iisa-innov.com/>) [49].

IV. National Interoperability Practices

Number of Interoperability Cases with Good Practice label

Low

- ERMIS – Interoperability Infrastructure and National Portal of Public Administration for one-stop, automated, interoperable digital services provision for citizens and businesses at national and local administration levels. (<http://www.ermis.gov.gr>) [30].
- The network of multi-channel Citizen Service Centers (KEP) as the administrative one-stop public service delivery centers, where citizens and businesses can have access to public service information and to over 1000 standardized administrative procedures, regardless of their digital capabilities, social orientation or locality, and the online platform (e-KEP), (<http://www.kep.gov.gr/>) [11], [29].
- TAXISnet portal for online tax and customs services, including e-filing of VAT forms with payment through banking systems services, e-filing of Income Tax forms, personalized information for Income Tax assessment and e-delivery of tax certificates (<https://www.taxisnet.gr/>) [11], [61].

Best Interoperability Practice

Title and Short Description:

ERMIS – Interoperability Infrastructure and National Portal of Public Administration (<http://www.ermis.gov.gr>) [30], consisting of 4 main components:

- The Service Registry, a web-based repository of services, documents, systems and organisations descriptions, containing currently 18,000 Public Sector Entities, 2066 Services, 3912 Documents, 1434 Unique Document Field Definitions, 614 BPMN Models for Services, 404 XML Schemas for Documents, 132 Core Components, 66 Data Types and several taxonomies for standardised information.
- The Greek National Interoperability Framework, including a complete set of guidelines and standards.
- The Service Delivery Platform, a multi-channel front-end, one-stop gateway for citizens, businesses and public organizations.
- The Service Transformation Toolkit, containing guidelines and patterns for transforming public services.

Status:

Officially launched in May 2009. Operational since June 2008.

IOP aspects covered:

- Business Process Management, Modelling, Simulation and Reengineering
- Service Registries
- Data Modelling
- Semantics
- Metadata Management
- Content Syndication
- Service Portals
- Interoperability Standardization, EIF, NIF
- Legal Framework

*Impact:**Benefits - Reusable Components – Patterns:*

ERMIS offers:

- A systematic, collaborative toolset to manage service transformation, from paper-based to electronic, already populated with a substantial set of information on services and documents.
- A set of guidelines and standards for managing portal creation and operation, back-office and front-office interoperability, eID management and service documentation – the main pillars of eGovernment.
- A centralised interoperability infrastructure that can be the delivery point of truly interoperable, one-stop, highly automated services while also federating on-line content from a variety of sources.
- An infrastructure for publishing available or needed Web Services on-line, so that service composition and mashing-up can be further promoted.
- Digital services that can be fulfilled in one stop, in one second and at no extra cost. This is extremely important especially for services that span several organisations and thus take a lot of time during manual fulfillment.
- Full on-line documentation of the whole spectrum of governmental services, the providing organisations and the legal framework, in four languages, with advanced semantic search mechanisms.
- A set of guidelines and standards for offering high-quality ICT services to the public sector, through the Greek NIF (for the ICT industry).
- The ERMIS Service Delivery Platform provides more than 100 highly sophisticated interoperable, cross-organisational digital services, in levels 3 and 4. More than 1,000 services currently exist at level 2. The most important services, provided at full-online availability, are the birth, citizenship, and family certificates.
- The next phase of the portal's evolution involves the implementation of ten of the most important daily transactions between companies and the Social Security Institute (IKA), such as the updating insurance.
- Compound financial gains, including both the administration and the citizens cost, amount to 30 EUR per certificate issued, generating an annual gain of more than 10 million EUR

Lessons Learnt:

- Nation-wide initiatives for one-stop service provision have to combine content syndicating portals, service registries and relevant standardisation in a coordinated effort.
- Service digitization has to be coupled with transformation, in order to ensure service delivery to citizens but also long-term growth and sustainability.
- Interoperability standardisation has to be supported by collaborative platforms, than just be in paper format, in order to assist diffusion within the public sector.
- Service registries can greatly assist in managing service transformation, as they provide a consistent infrastructure for sharing information across the Public Sector.
- Training and dissemination has to get a significant amount of a large project effort and budget, as diffusion within the public sector and citizens is of key importance.
- Language issues are extremely important in an Interoperability Infrastructure: all relevant metadata descriptions should be in local language – for the government officials to understand, modify and approve - and at least in English - for easiness of communication with other governments and

- practitioners in anticipation of cross-border e-Government services.
- Adequate time and effort needs to be spent for communicating and working together with government officials at various levels, for the actual agreement on the standards and the e-Government service-related definitions and for the final adoption.
 - Interoperability Infrastructures need to be supported by appropriate changes to the legal framework at national level.
 - The follow-the-service approach, by means of structuring the majority of standardisation, development, transformation or management efforts around the provision of the key services towards citizens and businesses is a very valuable tool, greatly assisting focusing on actual and measurable goals.

V. e-Government Interoperability

Interoperability Level of core e-Government services to citizens	33,3% (4/12)
Interoperability Level of core e-Government services to businesses	62,5% (5/8)
Connected Government Status	0,8% (1/24)

VI. e-Business Interoperability

Intra-organizational Business Processes Integration Level	57% (2006)	
Cross-organization Integration Level	15% (2006)	
Cross-organization Application-to-Application Integration Level	Not Available	
e-Invoicing Status:	Percentage of companies sending e-invoices:	Not Available
	Percentage of companies receiving e-invoices from suppliers:	Not Available
	Average share of sent e-invoices (as % of total invoices):	Not Available
	Average share of received e-invoices (as % of total invoices):	Not Available
	Average share of turnover stemming from e-invoices (as % of total turnover):	Not Available
B2B Data Standards Usage ("Percentage of companies using...")	... EDI-based standards:	Not Available
	... XML-based standards:	Not Available
	... proprietary standards:	Not Available
	... other technical standards:	Not Available
Interoperability Awareness- ("Percentage of companies saying that interoperability is important for e-business ...")	... within their sector:	Not Available
	... between sectors:	Not Available
	... for producing or providing products and service	Not Available

3.5 Hungary

Interoperability Factsheet - Hungary	
I. Interoperability as a strategic goal	
Strategic Priority on Interoperability	Yes
Hungary has a National Interoperability Framework since 2008. Furthermore, one of the four strategic fields of the "E-Public Administration 2010" Strategy is the introduction of integrated services for the governmental institutions, back offices in order to promote an interoperable, transparent and effective Public Administration [12], [22].	
National Interoperability Strategy Status	Unknown
II. National Interoperability Frameworks	
National Interoperability Framework Status	
Title:	Hungarian National Interoperability Framework [1]. Established within the eGovernment Framework System project that determines the standards, requirements and regulations covering unified technical, semantic and IT-security aspects, methodological application development and project management, as well as the monitoring of the platform for the development and operation of eGovernment in order to guarantee that the development of the independent sectoral and municipal sub-systems will result in the establishment of an interoperable, safe and modern eGovernment [12].
Version:	-
Release date:	December 2008
Focus/Scope:	Implementation-Operation
Audience:	Unknown (Available only in Hungarian)
Status:	Published
Responsible Agency:	EKK- Senior State Secretariat for Infocommunication http://ekk.gov.hu/hu
European Interoperability Framework Incorporation Status within National Interoperability Frameworks	
Unknown	
III. Interoperability Projects and Activities	
National Interoperability-related Activity: Number of interoperability-related projects funded from national resources	
Moderate	
Indicative projects:	
<ul style="list-style-type: none"> ▪ Project of "Implementing the Directive on services in the internal market 2006/123/EC" (Service Directive) to support the necessary IT developments for the creation of one-stop-shops and to fulfill the requirements of service providing activities from any of the EU member states to another in an electronic way [12]. ▪ Unified ePayment system to enable the online fulfillment of the citizens' financial obligations towards the Administration [12]. ▪ Project of the establishment of an electronic contact between the Hungarian Customs and Finance Guard authorities and the introduction of "one-window" management of affairs [12]. ▪ Hungary's eGovernment portal - Magyarország.hu (http://www.magyarorszag.hu/) generating and summarizing the contents of 46 government sites and acting as a services platform along with the transactional gateway, called 'Client Gate', that constitutes a central identification solution for the identification of citizens for electronic transactions with the public authorities [12]. ▪ Project on the updating of the electronic client central access and identification system ("Client Gate") that serves as the gateway allowing users to securely identify themselves online and gain 	

- access to any transactional government service available [12].
- EKG - Electronic Government Backbone, a secure country-wide network providing communication infrastructure and government intranet services [12].
- One-stop job portal for civil servants, aiming at centralizing the recruitment of public servants [12].
- VINGIS, national vineyard register, developed using open source software (http://www.osor.eu/case_studies/vingis-managing-hungarys-vineyards-with-open-source) [48].
- EVIG, Hungary’s Individual Entrepreneur Registry (EVIG), providing information about entrepreneurs to public authorities through interconnecting multiple public sector databases [50].

EU Interoperability Research Involvement: Number of EU-funded interoperability-related projects

Moderate

Indicative projects:

- PEPPOL (Pan-European Public eProcurement On-Line) project (<http://www.peppol.eu/>) [12].
- SAKE (“Semantic-enabled Agile Knowledge-based eGovernment”) project to facilitate knowledge management (knowledge personalization, proactivity and transferring as well as integration of structured and unstructured data) in the public sector (<http://www.sake-project.org/>) [32].
- AsIsKnown (A Semantic-based KNOWledge flow system for the European home textiles industry) project to promote collaboration within the home textiles industry (<http://www.asisknown.org/>) [45].
- NETC@RDS project on the deployment of an online service for the “electronification” of the European Health Insurance Card (EHIC) in 16 EFTA/EU countries and a trans-European interoperable infrastructure (<http://www.netcards-project.com>) [46].
- eMARKS project, to optimize the protection of trademarks through image-based searches of trademarks or industrial designs kept by Industrial Property offices to provide among others a new interoperability standard for the harmonization of Intellectual Property Office data collections (<http://emarks.iisa-innov.com/>) [49].
- EUROCET (European Registry for Organs, Tissues and Cells) project, aiming to set up a registry for data collection on organ, tissue and cell donation and transplantation activity shared by old and new Member States and to guarantee among others the harmonization of the terminology used and the use of common glossaries (<http://www.eurocet.org/>) [51].
- RISER (Registry Information Service on European Residents) project to set up a trans-European eGovernment web service as a Single-Point-of-Access for companies and administrations from across Europe to official civil registry information (<http://www.riser.eu.com>) [52].

IV. National Interoperability Practices

Number of Interoperability Cases with Good Practice label

No cases at all.

Best Interoperability Practice

Title and Short Description:

-

Status:

-

IOP aspects covered:

-

Impact:

-

V. e-Government Interoperability

Interoperability Level of core e-Government services to citizens	25% (3/12)
Interoperability Level of core e-Government services to businesses	50% (4/8)
Connected Government Status	3,3% (6/184,5)

VI. e-Business Interoperability

Intra-organizational Business Processes Integration Level	12% (2007)
--	------------

Cross-organization Integration Level		6% (2007)
Cross-organization Application-to-Application Integration Level		14% (2008)
e-Invoicing Status:	Percentage of companies sending e-invoices:	9% (2006)
	Percentage of companies receiving e-invoices from suppliers:	9% (2006)
	Average share of sent e-invoices (as % of total invoices):	23% (2006)
	Average share of received e-invoices (as % of total invoices):	18% (2006)
	Average share of turnover stemming from e-invoices (as % of total turnover):	31% (2006)
B2B Data Standards Usage ("Percentage of companies using...")	... EDI-based standards:	3% (2006)
	... XML-based standards:	2% (2006)
	... proprietary standards:	10% (2006)
	... other technical standards:	3% (2006)
Interoperability Awareness- ("Percentage of companies saying that interoperability is important for e-business ...")	... within their sector:	9% (2006)
	... between sectors:	6% (2006)
	... for producing or providing products and service	11% (2006)

4. Conclusions

The current deliverable analyses the updated methodology behind the Interoperability Barometer mechanism and presents extended reports of the interoperability findings in a small sample of countries, comprising Bulgaria, Croatia, Cyprus, Greece and Hungary. Although important information is not publicly available and the reports have to be validated by the G.I.C. network of contact persons to be established, the collection of information on the selected interoperability indicators allows for useful conclusions to be drawn. These conclusions are summarized in the following paragraphs.

It is quite remarkable that all five countries examined are interoperability-aware and have recognized interoperability as a strategic priority: even if interoperability may not be explicitly mentioned in the national strategies (e-Government strategies, digital strategies etc.) as a key field, ambitious goals have been set in all countries for developing centralized, integrated systems and standardized solutions. Still, neither of the countries has established a “pure” national interoperability strategy, indicating that the development of a National Interoperability Framework, which in general defines standards, specifications and rules for the development of interoperable front- and back-office systems, currently emerges as the most critical step towards the achievement of Interoperability. In fact, three out of the five countries under examination (Bulgaria, Greece and Hungary) have already established a National Interoperability Framework, while in the other two (Croatia and Cyprus), such a project is currently under development. Although important information with regard to the NIFs is currently missing (due to non-availability in the English language or because the project is under development), one can distinguish the cases of Bulgaria and Greece, i.e. the Bulgarian and the Greek NIFs that both have an orientation towards the government sector and have been developed in conformance with the European Interoperability Framework (EIF).

As a result of the fact that interoperability has been recognized as a key priority, all five countries are in place to demonstrate a considerable interoperability-related activity (“Moderate”), with Croatia and Greece having the highest numbers of interoperability-related projects that are funded from national resources. These are mainly large-scale infrastructures’ and services’ projects that do indicate that there is significant governmental and administrative support, but they do not reflect as well the countries’ maturity to harness the benefits of interoperability, as few of them have resulted in flexible and reconfigurable IO solutions, i.e. good practice cases, that are transferable and reusable: Greece, Croatia and Cyprus have each a low number of cases with a good practice label, while similar information is not available for Bulgaria and Hungary.

On the other hand, the findings reported with regard to the European Interoperability Research Involvement are not that favorable, since with the exceptions of Greece and Hungary that participate or have participated in a remarkable number of EU-funded activities and projects, the rest of countries present quite limited involvement and need to create the necessary conditions for interoperability research to evolve further.

On another level, an indication of the interoperability maturity of the countries under examination is provided through the selected e-Government and e-Business interoperability indicators. Although all countries are striving to improve online public services, the interoperability level of core e-Government services to citizens and business, as defined within this framework does not exceed for all countries the percentages of 33,3% and 62,5% respectively (Greece), proving that there is still room for more advancements. Still, shifting the focus from the limited number of core e-Government services to the broader scope of the Web Measure Index, within the frame of the UN e-Government Survey, which is taken into account within the Interoperability Barometer through the “Government Connected Status” indicator, the reported findings are extremely unfavorable for all five countries.

Finally, the level of e-Business Interoperability, depicted through the indicators “Intra-organizational Business Processes Integration Level”, “Cross-organization Integration Level” and “Cross-organization Application-to-Application Integration Level” does not exceed for all countries the percentages of 57% (Greece), 15% (Greece) and 36% (Croatia), indicating that significant effort has to be put on bringing the benefits of interoperability down to the practical level in the business sector as well. Of course, this assumption should not be accepted without question, since up-to-date information is not available for the countries. Unfortunately, with the exception of Hungary, no information

is available on further e-Business Interoperability indicators (“e-Invoicing Status”, “B2B Data Standards Usage” and “Interoperability Awareness”), and thus it is not possible to make comparisons among the countries under examination.

Though, a more thorough analysis of the Interoperability Status of the countries monitored by the Greek Interoperability Centre will be provided with the development of an Interoperability Maturity Model and the classification of the countries in a set of maturity levels, the information collected so far proves that all five countries need to intensify their efforts towards the promotion and adoption of interoperability. Of course, the first step within this frame is the establishment of a National Interoperability Framework; however once a consistent strategy on interoperability has been formulated along with a set of relevant guidelines, the focus has to be shifted from the strategic to the practical level with the undertaking and implementation of suitable initiatives and projects as well as with the evaluation of their outcomes for benchmarking and training purposes.

Since the updating of the Interoperability Barometer is a continuous and dynamic process, more interoperability reports will be made available progressively through the G.I.C. site. The updating process will cover both the production of interoperability factsheets for more countries as well as the validation of the reports already available.

Annex I – General Indicators

➤ Information Society: Structural Indicators

The Information Society Indicators investigate the digital divide, broadband penetration, internet access and ICT expenditure features of a country as well as the experience with e-Commerce and e-Government. The information provided in this section stems mainly from Eurostat, the Statistical Office of the European Communities [24] and secondly from the annual report of Capgemini on e-Government Benchmark Measurement [22]. For each indicator a brief description is provided if necessary along with the source and year of the data. The values of all indicators are summarized in Table 3 for the countries of Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, FYROM, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Serbia, Slovakia, Slovenia and Turkey.

Digital Divide

To illustrate the digital divide Capgemini [22] uses the index of internet use in at risk groups in 2008 (Eurostat), combining the results of the sub-indicators “Aged 55-64”; “Aged 65-74”; “Women”; “Low educated”; “Inactive”; “Unemployed” and “Rural”. The difference from 1 indicates the level of disadvantage for the specific ‘risk group’ as compared to the mean, or the comparable non-risk group.

Source: Capgemini, Year of data: 2008.

Broadband penetration

- Broadband penetration rate - Number of broadband access lines per 100 inhabitants

The broadband penetration rate describes the number of dedicated, high-speed connections per 100 inhabitants. This indicator shows how widely broadband access to the internet has spread in the countries on the general level, not specifying by user group. Broadband lines are defined as those with a capacity equal or higher than 144 Kbits/s. Various technologies are covered; ADSL, cable modem as well as other types of access lines.

Source: Eurostat, Year of data: 2008.

- Percentage of households with broadband connection

Households who have broadband access at home - Percentage of households with at least one member aged 16 to 74.

Source: Eurostat, Year of data: 2008.

- Percentage of enterprises with broadband connection

Enterprises which have broadband access - Percentage of enterprises with at least 10 persons employed in the given NACE sectors.

Source: Eurostat, Year of data: 2008.

Internet Usage

- Level of Internet access – households: percentage of households who have Internet access

Percentage of households who have Internet access at home. All forms of Internet use are included. The population considered is aged 16 to 74.

Source: Eurostat, Year of data: 2009.

- Percentage of individuals regularly using the internet

Percentage of individuals regularly using the internet. Regular use is at least once per week.

Source: Eurostat, Year of data: 2008.

ICT Expenditure

- Overall ICT expenditure in the country as a percentage of GDP- Information technology Expenditure

Annual data on expenditure for IT hardware, equipment, software and other services as a percentage of GDP.

Source: Eurostat, Year of data: 2006.

- Overall ICT expenditure in the country as a percentage of GDP - Communications Expenditure

Annual data on expenditure for telecommunication hardware, equipment, software and other services as a percentage of GDP.

Source: Eurostat, Year of data: 2006.

e-Commerce

- e-Commerce via Internet - Percentage of enterprises' total turnover from E-commerce via Internet

Information comes from the surveys carried out by the National Statistical Institutes on usage of Information and Communication Technologies (ICT) by enterprises. The indicator is calculated as the enterprises' receipts from sales through the Internet as percentage of the total turnover. Sales through other networks are not included, leaving out for instance EDI-based sales. Only enterprises with 10 or more employees are covered. The year given relates to the survey year. The e-commerce data relates to the year prior to the survey.

Source: Eurostat, Year of data: 2007.

- Percentage of enterprises having received orders on-line over the last calendar year (at least 1%)

Source: Eurostat, Year of data: 2008.

e-Government

- e-Government on-line availability (Supply side)

This indicator measures the on-line availability of basic public services. 'Basic' covers the 20 public services most frequently used by households/citizens (12) and enterprises (8). The indicator shows the percentage of the 20 basic services which are fully available online i.e. for which it is possible to carry out full electronic case handling. For example if in a country 13 of the 20 services were measured as being 100% available on-line and one service was not relevant (e.g. does not exist), the indicator is 13/19 which is 68.4%. Measurement is based on a sample of URLs of public web sites agreed with Member States as relevant for each service.

Source: Eurostat, Year of data: 2007.

- e-Government usage by individuals (Demand side)

Percentage of individuals aged 16 to 74 using the Internet for interaction with public authorities (i.e. having used the Internet in the last 3 months for one or more of the following activities:

- obtaining information from public authorities web sites,
- downloading official forms,

- sending filled in forms).

Source: Eurostat, Year of data: 2009.

- e-Government usage by enterprises (Demand side)

Percentage of enterprises using the Internet for interaction with public authorities (i.e. having used the Internet for one or more of the following activities:

- obtaining information,
- downloading forms,
- filling-in web-forms,
- full electronic case handling).

All enterprises with 10 or more persons employed are included (without financial sector).

Source: Eurostat, Year of data: 2009.

Table 3: Information Society: structural indicators

Countries	Digital Divide: Index of internet use in at risk groups	Broadband Penetration			Internet Usage		ICT Expenditure		e-Commerce Indicators		e-Government Indicators		
		Broadband penetration rate - Number of broadband access lines per 100 inhabitants	Percentage of households with broadband connection	Percentage of enterprises with broadband connection	Percentage of households who have Internet access at home	Percentage of individuals regularly using the internet	Overall ICT expenditure in the country as a percentage of GDP- Information technology Expenditure	Overall ICT expenditure in the country as a percentage of GDP - Communications Expenditure	e-Commerce via Internet - Percentage of enterprises' total turnover from E-commerce via Internet	Percentage of enterprises having received orders on-line over the last calendar year	e-Government on-line availability - Percentage of online availability of 20 basic public services	e-Government usage by individuals	e-Government usage by enterprises
Year of data	2008	2008	2008	2008	2009	2008	2006	2006	2007	2008	2007	2009	2009
Albania	-	-	-	-	-	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	-	-	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	0,45	9.5	25%	62%	30%	30%	2.0%	7.1%	0.5%	2%	15%	10%	60%
Croatia	-	-	-	88%	-	-	-	-	2.1%	16%	-	8% (2008)	61%
Cyprus	0,53	16.0	43%	79%	53%	35%	-	-	0.6%	7%	45%	22%	72%
Czech Republic	0,6	15.8	-	-	54%	51%	3.2%	4.4%	3.7%	15%	55%	24%	66%
Estonia	0,71	23.6	58%	88%	63%	62%	2.9%	6.8%	1.0% (2005)	11%	70%	44%	79%
F.Y.R.O.M.	-	-	-	-	42%	21% (2006)	-	-	-	6%	-	12%	-
Greece	0,46	11.2	31%	74%	38%	33%	1.2%	3.2%	0.9%	6% (2007)	45%	12%	81%
Hungary	0,64	15.7	48%	72%	55%	49%	2.5%	5.0%	2.4%	4%	50%	25%	68%

Countries	Digital Divide: Index of internet use in at risk groups	Broadband Penetration			Internet Usage		ICT Expenditure		e-Commerce Indicators		e-Government Indicators		
		Broadband penetration rate - Number of broadband access lines per 100 inhabitants	Percentage of households with broadband connection	Percentage of enterprises with broadband connection	Percentage of households who have Internet access at home	Percentage of individuals regularly using the internet	Overall ICT expenditure in the country as a percentage of GDP- Information technology Expenditure	Overall ICT expenditure in the country as a percentage of GDP - Communications Expenditure	e-Commerce via Internet - Percentage of enterprises' total turnover from E-commerce via Internet	Percentage of enterprises having received orders on-line over the last calendar year	e-Government on-line availability - Percentage of online availability of 20 basic public services	e-Government usage by individuals	e-Government usage by enterprises
						(2007)							
Latvia	0,6	16.3	53%	62%	58%	57%	2.3%	7.6%	-	6%	30%	23%	64%
Lithuania	0,56	16.1	51%	56%	60%	50%	1.8%	5.0%	5.4%	22%	35%	19%	91%
Malta	0,62	20.5	59%	89%	64%	46%	-	-	-	13%	95%	24%	79%
Moldova	-	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro	-	-	-	-	-	-	-	-	-	-	-	-	-
Poland	0,55	9.6	48%	59%	59%	44%	2.6%	5.0%	3.2%	8%	25%	18%	61%
Romania	0,46	10.7	30%	44%	38%	26%	2.1%	6.2%	1.2%	3%	35%	6%	41%
Serbia	-	-	-	-	-	26% (2007)	-	-	-	12% (2007)	-	-	-
Slovakia	0,55	9.6	58%	79%	62%	62%	2.5%	4.2%	1.1%	5%	35%	31%	92%
Slovenia	0,56	19.1	59%	84%	64%	52%	2.2%	3.6%	-	8%	90%	32%	89%
Turkey	-	-	-	-	20% (2007)	12% (2005)	-	-	-	-	55%	7% (2007)	-

➤ EC e-Government Benchmark

Sophistication Stage of Online Public Services

In order to measure the sophistication of online public services, an e-service sophistication model is used [22]. This model illustrates the different degrees of sophistication of online public services going from “basic” information provision over one-way and two way interaction to “full” electronic case handling.

Table 4: 5-stage sophistication model

5-stage sophistication model	
Stage 1:	Information
Stage 2:	One way interaction (downloadable forms)
Stage 3:	Two-way interaction (electronic forms)
Stage 4:	Transaction (full electronic case handling)
Stage 5:	Personalisation (pro-active, automated service delivery)

The 5th level gives an indication of fully integrated electronic procedures that help reduce “red tape” and improve data consistency; where no other physical action is required on behalf of the applicant.

In Tables 5 and 6, the sophistication stage reached for each service is indicated with reference to the maximum stage possible for the service.

The information provided, covers the basket of 20 basic public services (12 services for citizens and 8 services for enterprises), composed by Capgemini for the European Commission [22]. The information available covers the following list of countries: Bulgaria [2], Croatia [3], Cyprus [4], [5], Czech Republic [6], [7], Estonia [8], FYROM [9], [10], Greece [11], Hungary [12], Latvia [13], Lithuania [14], Malta [15] [16], Poland [17], Romania [18], Slovakia [19], Slovenia [20] and Turkey [21].

Table 5: Sophistication stage of online public services for citizens

Countries	Sophistication Stage of 12 basic public services for citizens															
	Bulgaria	Croatia	Cyprus	Czech Republic	Estonia	FYROM	Greece	Hungary	Latvia	Lithuania	Malta	Poland	Romania	Slovakia	Slovenia	Turkey
1. Income taxes: declaration, notification of assessment	5/5	2/5	5/5	4/5	5/5	N/A	5/5	4/5	4/5	5/5	5/5	4/5	2/5	4/5	5/5	5/5
2. Job search services by labour offices	4/4	3/4	4/4	4/4	4/4	3/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4
3. Social security benefits																
a. Unemployment benefits	4-5/5	3/5	2-3/5	3-4/5	3-4/5	N/A	1-2/5	2/5	2-3/5	2-3/5	4-5/5	1-2/5	2-3/5	1-2/5	4/5	3-4/5
b. Child allowances	4-5/5	2/5	2-3/5	3-4/5	3-4/5	N/A	1-2/5	2/5	2-3/5	2-3/5	4-5/5	1-2/5	2-3/5	1-2/5	4/5	3-4/5
c. Medical costs (reimbursement or direct settlement)	4-5/5	2/5	2-3/5	3-4/5	3-4/5	N/A	1-2/5	2/5	3/5	2-3/5	N/A	1-2/5	2/5	1-2/5	5/5	3-4/5
d. Student grants	4-5/5	3/5	2-3/5	3-4/5	3-4/5	3/5	1-2/5	2/5	2-3/5	2-3/5	4-5/5	1-2/5	2-3/5	1-2/5	4/5	3-4/5
4. Personal documents: passport and driver's licence																
a. Passport	1-2/4	1/4	1-2/4	1/4	3-4/4	1-2/4	1-2/4	2/4	1-2/4	1-2/4	2-3/4	1-2/4	1-2/4	3/4	4/4	2-3/4
b. Driver's licence	1-2/4	2/4	1-2/4	1/4	3-4/4	N/A	1-2/4	2/4	1-2/4	1-2/4	N/A	1-2/4	1-2/4	3/4	4/4	2-3/4
5. Car registration (new, used, imported cars)	1/4	1/4	4/4	1/4	2/4	N/A	4/4	3/4	1/4	1-2/4	4/4	1-2/4	2/4	2/4	4/4	1-2/4
6. Application for building permission	0-1/4	2/4	2/4	2-3/4	2/4	N/A	0-1/4	1/4	1-2/4	2-3/4	4/4	1-2/4	1-2/4	1-2/4	4/4	0-1/4
7. Declaration to the police (e.g. in case of theft)	1/3	1/3	1/3	3/3	3/3	N/A	1/3	3/3	1/3	2/3	3/3	1/3	1/3	1/3	3/3	3/3
8. Public libraries (availability of catalogues, search tools)	1/5	3/5	4/5	3/5	5/5	N/A	3/5	3/5	0-1/5	4/5	5/5	3/5	1/5	0-1/5	5/5	4/5
9. Certificates (birth, marriage): request and delivery	2/4	1/4	2/4	1/4	2/4	1-2/4	4/4	3/4	3/4	1-2/4	4/4	2/4	N/A	1/4	4/4	1/4
10. Enrolment in higher education/university	2-3/4	2/4	2-3/4	2-3/4	4/4	N/A	2/4	4/4	1-2/4	3/4	3-4/4	2-3/4	1-2/4	2/4	4/4	3/4
11. Announcement of moving (change of address)	0/4	2/4	1/4	1/4	4/4	N/A	2/4	3/4	4/4	2/4	4/4	1-2/4	1/4	2/4	4/4	1/4
12. Health related services (interactive advice on the availability of services in different hospitals; appointments for hospitals)	2/4	4/4	1/4	0/4	3/4	N/A	2/4	0/4	2/4	1-2/4	4/4	0-1/4	2/4	1/4	4/4	0-1/4

Table 6: Sophistication stage of online public services for businesses

Countries	Sophistication Stage of 8 basic public services for businesses															
	Bulgaria	Croatia	Cyprus	Czech Republic	Estonia	FYROM	Greece	Hungary	Latvia	Lithuania	Malta	Poland	Romania	Slovakia	Slovenia	Turkey
1. Social contributions for employees	3/4	4/4	4/4	4/4	4/4	1-2/4	4/4	2/4	3-4/4	3/4	4/4	4/4	4/4	4/4	4/4	4/4
2. Corporate tax: declaration, notification	3/4	2/4	4/4	4/4	4/4	3/4	4/4	4/4	4/4	4/4	4/4	2/4	4/4	4/4	4/4	4/4
3. VAT: declaration, notification	3/4	4/4	4/4	4/4	4/4	N/A	4/4	4/4	4/4	4/4	4/4	2/4	4/4	4/4	4/4	4/4
4. Registration of a new company	2/4	3/4	3/4	4/4	4/4	2/4	2/4	3/4	2/4	2/4	4/4	2/4	3/4	3/4	4/4	2/4
5. Submission of data to statistical offices	2/5	2/5	2/5	4/5	4/5	N/A	4/5	5/5	3/5	4/5	4/5	3/5	5/5	3/5	5/5	5/5
6. Customs declaration	3/4	4/4	4/4	4/4	4/4	N/A	4/4	4/4	3/4	4/4	4/4	4/4	4/4	3/4	4/4	4/4
7. Environment-related permits (incl. reporting)	1/5	2/5	1/5	4/5	5/5	N/A	2/5	3/5	1/5	1/5	5/5	0-1/5	2/5	1/5	5/5	2/5
8. Public procurement	2/4	3/3	2/4	4/4	3/4	3/4	2/4	2/4	3/4	3/4	4/4	3/4	4/4	4/4	2/4	4/4

➤ International Benchmarks

In this section we present the score and ranking of each country monitored by the Interoperability Barometer in selected international benchmarks produced by the United Nations, the World Economic Forum and the Economist Intelligence Unit. The ranking attributed to each country may be compared with the number of countries involved in the benchmark, while its score is provided with regard to the maximum score possible. The benchmarks put the outcomes of the Interoperability Barometer into international perspective, provide a wider view of the country's performance as an Information Society and allow a better understanding of the country's propensity for interoperability projects' and activities' uptake and advancement. Both the scores and rankings in the selected benchmarks are summarized in Table 7.

- **UN e-Government Readiness Index 2008**

The United Nations e-Government Survey 2008 "From e-Government to Connected Governance" [23] presents an assessment of the new role of the government in enhancing public service delivery, while improving the efficiency and productivity of government processes and systems.

Number of Countries in the benchmark: 189.

- **EIU e-Readiness Ranking 2009**

E-readiness [26] is a measure of the quality of a country's ICT infrastructure and the ability of its consumers, businesses and governments to use ICT to their benefit.

Number of Countries in the benchmark: 70.

- **WEF Global Competitiveness Index 2009-2010**

Expressed through the WEF Global Competitiveness Index [27], a nation's level of competitiveness reflects the extent to which it is able to provide rising prosperity to its citizens.

Number of Countries in the benchmark: 133.

- **WEF Networked Readiness Index 2008-2009**

This benchmark [28] measures the presence of an ICT-conducive environment, the degree of preparation needed to use ICT for individuals, business, and government; and the actual use of ICT.

Number of Countries in the benchmark: 134.

Table 7: International Benchmarks

	United Nations e-Government Readiness Index 2008		Economist Intelligence Unit e-Readiness 2009		WEF Global Competitiveness Index 2009-2010		WEF Networked Readiness Index 2008-2009
	Ranking (out of 189)	Score (out of 1)	Ranking (out of 70)	Score (out of 10)	Ranking (out of 133)	Score (out of 7)	Ranking (out of 134)
Albania	86	0.4670	-	-	96	3.72	105
Bosnia and Herzegovina	94	0.4509	-	-	109	3.53	106
Bulgaria	43	0.5719	47	5.11	76	4.02	68
Croatia	47	0.5650	-	-	72	4.03	49
Cyprus	35	0.6019	-	-	34	4.57	33
Czech Republic	25	0.6696	31	6.46	31	4.67	32
Estonia	13	0.7600	24	7.28	35	4.56	18
F.Y.R.O.M.	73	0.4866	-	-	84	3.95	79
Greece	44	0.5718	33	6.33	71	4.04	55
Hungary	30	0.6494	35	6.04	58	4.22	41
Latvia	36	0.5944	37	5.97	68	4.06	48
Lithuania	28	0.6617	32	6.34	53	4.30	35
Malta	29	0.6582	23	7.46	52	4.30	26
Moldova	93	0.4510	-	-	-	-	99
Montenegro	100	0.4282	-	-	62	4.16	71
Poland	33	0.6134	39	5.80	46	4.33	69
Romania	51	0.5383	48	5.07	64	4.11	58
Serbia	77	0.4828	-	-	93	3.77	84
Slovakia	38	0.5889	36	6.02	47	4.31	43
Slovenia	26	0.6681	29	6.63	37	4.55	31
Turkey	76	0.4834	43	5.34	61	4.16	61

Annex II – Interoperability Horizontal Issues

Annex II presents the taxonomy of interoperability-related key terms with regard to interoperability horizontal issues, already provided in the D1.1 series of deliverables. The horizontal issues mapping includes aspects of Organisational, Semantic and Technical Interoperability, Interoperability Standardization, Assessment and Training, Legal Issues on Interoperability, Interoperability Business Models and Interoperability Policies and serves the purpose of facilitating any relevant categorization within the frame of the interoperability Barometer.

Table 8: Interoperability Horizontal Issues

1.	Organizational Interoperability
1.1.	Enterprise Architectures
1.1.1.	Enterprise Modelling Frameworks
1.1.2.	Enterprise Modelling Languages and Notations
1.1.3.	Enterprise (Organizational) Alignment
1.2.	Business Process Management
1.2.1.	Business Process Modelling
1.2.2.	Business Process Integration
1.2.3.	Business Process Alignment
1.2.4.	Business Process Simulation
1.2.5.	Business Process Reengineering
1.2.6.	Business Process Management Suites
1.3.	Collaborative Business Networks
1.3.1.	Reference Models
1.3.2.	Technologies and Tools enabling collaboration in real-time
1.3.2.1.	Service Contracts
1.3.2.2.	Service Level Agreements
1.3.2.3.	Integrated Service Registries
1.3.2.4.	Service Utilities - ISU
1.3.3.	Virtual Organization breeding environments
1.4.	Digital Ecosystems for Business Innovation
1.5.	Cross-country Organizational Interoperability
2.	Semantic Interoperability
2.1.	Ontology Engineering
2.1.1.	Ontology Design
2.1.2.	Ontology Mapping
2.1.3.	Ontology Evolution
2.1.4.	Ontology Reasoning
2.1.5.	Ontology Evaluation
2.1.6.	Ontology-driven Systems
2.2.	Knowledge Management
2.2.1.	Knowledge Sources and Types

2.2.2.	Knowledge Capture and Organization
2.2.3.	Inter-organizational Knowledge Sharing
2.2.4.	Knowledge-enabled Processes and Systems
2.2.5.	Collaboration Management
2.3.	Data Engineering
2.3.1.	Data Modelling
2.3.1.1.	Business Document Modelling
2.3.1.2.	Core Components Modelling
2.3.2.	Semantics
2.3.2.1.	Semantic Annotation
2.3.2.2.	Semantic Mapping
2.3.3.	Information Integration
2.3.4.	Data Mediation
2.3.5.	Metadata Management
2.3.5.1.	Metadata Definition
2.3.5.2.	Metadata Retrieval
2.4.	Data Repositories
2.4.1.	Generic Data Repositories
2.4.2.	Specific, Targeted Data Repositories
2.5.	Cross-country Semantic Interoperability
3.	Technical Interoperability
3.1.	Communication Protocols
3.1.1.	Physical Layer
3.1.2.	Data Link Layer
3.1.3.	Network Layer
3.1.4.	Transport Layer
3.2.	Business Process and Service Execution
3.2.1.	Business Process Workflow
3.2.2.	Business Process Monitoring
3.2.3.	Service Coordination
3.2.4.	Service Composition
3.3.	Information and Content
3.3.1.	Information Storage
3.3.2.	Information Transformation
3.3.3.	Information Exchange
3.3.4.	Information and Content Presentation
3.3.5.	Content Aggregation
3.3.6.	Content Syndication

3.3.7.	Content Accessibility
3.4.	Authentication and Security
3.4.1.	IP Security
3.4.2.	Transport Security
3.4.3.	Authentication
3.4.4.	Identification
3.4.5.	Encryption
3.5.	Enterprise Application Integration
3.5.1.	Enabling Components
3.5.1.1.	Middleware
3.5.1.2.	Back-office Systems
3.5.1.3.	Legacy Systems
3.5.1.4.	Service Portals
3.5.2.	Architectures
3.5.2.1.	Service-oriented Architecture
3.5.2.2.	Object-oriented Architecture
3.5.2.3.	n-tier Architecture
3.5.2.4.	Client-server Architecture
3.5.2.5.	Model-driven Architecture
3.5.3.	Web Services Orchestration
3.6.	Infrastructures Support
3.6.1.	Parallel Computing
3.6.2.	Grid (Distributed) Computing
3.6.3.	Devices
3.6.4.	Ambient Intelligent Applications
4.	Interoperability Standardization
4.1.	Interoperability Standards
4.1.1.	ISO Standards
4.1.2.	UN Standards
4.1.3.	W3C Standards
4.1.4.	CEN Standards
4.1.5.	OASIS Standards
4.1.6.	OMG Standards
4.2.	Interoperability Frameworks
4.2.1.	European Interoperability Framework (EIF)
4.2.2.	National Interoperability Frameworks
5.	Interoperability Assessment
5.1.	Interoperability Status Assessment Models

5.2.	Interoperability Impact Assessment Models
5.3.	Interoperability Metrics
6.	Interoperability Training
6.1.	Curricula development
6.2.	Lessons development
6.3.	Trainee Assessment methods
7.	Legal Issues on Interoperability
7.1.	Legal and Business Rules Extraction
7.2.	Legal and Business Rules Modelling
7.3.	Legal and Business Rules Execution
7.4.	Legal and Business Rules Management
8.	Interoperability Business Models
8.1.	Business Model Definition
8.2.	Business Model Testing - Simulation
8.3.	Business Models Best Practices
9.	Interoperability Formal Methods
9.1.	Problem Definition Methods
9.2.	Pattern Recognition Methods
9.3.	Interoperability Solution-Driven Methods
9.4.	Interoperability Models

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