2009

ESIIG2

cen EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CISIS

epractice.eu
Meet > Share > Learn

EuroSpace group
communications, fairs, advertising

i2010

SEMIC.EU Semantic Interoperability Centre Europe

InterOP - VLab

IDABC European eGovernment Services

TECHNOLOGY INNOVATION analyses

Second European Summit on Interoperability in the iGovernment
OFFICIAL PROCEEDINGS

**Second European Summit
on Interoperability in the iGovernment**
OFFICIAL PROCEEDINGS

Rome, 20 - 22 October 2008

EUROSPACE

Regione Lazio

LAit LAZIO innovazione tecnologica

Second European Summit on Interoperability in the iGovernment
OFFICIAL PROCEEDINGS

Second European Summit on Interoperability in the iGovernment

ESIIG2

Rome, 20-22 October 2008

OFFICIAL PROCEEDINGS

Table of Contents

Second European Summit on Interoperability in the iGovernment - ESIIG2 OFFICIAL PROCEEDINGS

Foreword

**Welcome by the regional Minister for Consumer Protection
and Administrative Simplification**

Esiig2, the Second European Summit on Interoperability in the iGovernment, represented an important challenge for the Lazio Region and for the regional Ministry for Consumer Protection and Administrative Simplification: the first real step towards Europe, the first big European event organized by the Lazio Region.

A lot of people contributed to achieve this goal and this success was the result of the important job of a team that has believed in this initiative since the beginning, from the organization of the Towards ESIIG 2 Conference of the last October.

The contribution of the Generalitat Valenciana for the realization of this ambitious project was fundamental: our support in favour of the region candidate to the organization of the next Summit, ESIIG 3, will be as much remarkable.

When we decided to organize this Summit, our most important aim was to share it with the other European regions, with the stakeholders active in the field, the representatives of the European Commission, of the national and regional governments of Europe, of the research field and experts of the ICT sector.
We wanted to start a path along with the European Institutions.

During the last year our team has travelled all around Europe, promoting relations, collaborations, sponsoring the Summit towards other European institutions, meeting the administrative, technical and political representatives of other public administrations in Europe, fostering the academic world, the small and medium enterprises and the public administrations of the 27 States Members of the European Union to present original papers for the Summit and to propose innovative cases in the field of interoperability as regards the iG2.0 Award.

The most important aim we wanted to achieve in the organization of this Summit was to share and listen to everybody's priorities, collaborate and, simply, "interoperate".

Over the last year, we have worked incessantly to promote "interoperability" at a technical level during the three days of the summit, and we developed a large number of relations and initiatives with the aim to create a community of ESIIG, where members could dialogue, collaborate, interact with each others, discuss, share and propose.

The Call for Papers is one of the most important initiatives promoted by the Summit. Our team promoted and sponsored this initiative at a European level, spreading dissemination activities with the purpose to involve every Member State. We received important and high profile contributions.

The Technical and Scientific Committee of ESIIG2, composed by important personalities in the field of Public Administrations at a National, European and International level, by stakeholders active in the field of interoperability, representatives of the European Commission and of the ICT sector, carried out an important work in the evaluation of the papers , increasing in this way the qualitative level of the initiative.

Moreover, we allowed experts of the ICT field to visualize and discuss the papers selected by the Technical and Scientific Committee with the respective authors. The Agora facilitated and will continue to stimulate the meeting within the ESIIG 2 community before, during and after the Summit.

Another important initiative promoted at a European level, with the collaboration of the European Union, e-Practice, was the iG 2.0 Award, who had the main objective of sharing the current best practices in the field of interoperability in the public eGovernment at local, regional, national and European level.

The Award was open to a wide spectrum of participants, from public authorities at local, regional, national and European level up to stakeholders of the private sector experts in ICT field and in the Knowledge and Information Society.

The comparison between the ICT experts in the field and the Representatives of Public Administrations was promoted by the creation of a tool that enables the discussion, debate and interaction amongst European stakeholders and intends to promote interoperability on a technological, inter-personal and inter-institutional level: the Forum. In fact, it is possible to discuss and comment on the articles of the Interoperability Declaration presented during the First European Summit on Interoperability in the iGovernment, through the Forum and send your comments, suggestions, proposals to make the Declaration a representative document for all needs, priorities and existing conditions concerning interoperability, which are different from country to country and from region to region. It is important to underline, one last time, that every initiative related to the Summit had as main aim the dialogue, sharing and comparison.

We believe that this way of thinking represents the key of success of this initiative and, most of all, of the development of a European environment which is really "interoperable". This message has been warmly welcomed and appreciated by the Member of the European Commission for the Information Society and Media, Mrs Viviane Reding, that conferred her Patronage to the Summit, which is a great honour for us.

Mario Michelangeli

Assessore Tutela dei Consumatori e
e Semplificazione Amministrativa

ESIIG

ESIIG

The First European Summit on Interoperability in the iGovernment (ESIIG 1) was celebrated in Valencia on November 22-24, 2006.

The initiative received the support of the European Commission and the Committee of the Regions and was awarded with the eGovernment Good Practice Label given by the eGovernment Good Practice Framework co-funded by the European Commission.

The Summit represented the Valencian Government contribution to promote interoperability in the eGovernment and to increase cooperation amongst European Regions, through good practices sharing, the implementation of online services and the spreading of knowledge, information and know-how.

A Scientific Committee was created for the evaluation and selection of the speakers and their presentations.

It was composed by very relevant representatives of the ICT field both from the private and public sector. Furthermore, the Scientific Committee selected the most outstanding cases presented during the Summit in order to award them with the IG 2 Prize.

During the closing ceremony the representatives of the Valencia regional Government presented the Interoperability Declaration of Valencia and proposed the creation of a European Regional Network for Interoperability (ERNI).

This is a network based on the common aim to promote and improve interoperability in the eGovernment.

The first recipients and users of the network must be public European administrations, through the iGovernment, perceived as an electronic, interoperable, intelligent, inclusive, innovative and integrated Government.

The Interoperability Declaration of Valencia outlines the importance of interoperability as perceived on a European level in order to create a "European Common Smart Government".

In this sense, interoperability could be a crucial means for European public administrations of any territorial level, to create more efficient, effective and transparent and inclusive public services for all the citizens.

What is ESIIG2?

The Second Summit on interoperability in the iGovernment represented an unprecedented occasion for:

- Enhancing the role of European Regions with respect to the priorities of Interoperability as a key element for the efficient, sustainable and equal development of eGovernment and for the creation of an intelligent and innovative European Government, fostering the development of the Knowledge Society, a higher European integration, a substantial increase of competitiveness and productivity of the EU in the international scenario;

- Analyzing the European Interoperability Framework produced by IDABC, as a model for the adaptation and comparison of the single European regional frameworks for Interoperability;

- Verifying the state of the art of Interoperability in Europe;

- Promoting European successful initiatives in the field of Interoperability;

- Proceeding concretely in the constitution of ERNI (European Regional Network for Interoperability);

- Elaborating, with the participation of all the stakeholders involved, the New Interoperability Declaration of Rome 2008.

Commissioner Reding message

"Onorevole Assessore, distinti ospiti, signore e signori, è un grande piacere per me aprire il Secondo Vertice Europeo sull'Interoperabilità nell'iGovernment.

In organizing this event, the participating regions are underlining the political priority that they are giving to eGovernment interoperability.

This fits perfectly with the Commission's i2010 initiative, with his third pillar that is aimed at promoting an inclusive European information society, that is promoting the better provision for public services via iGovernment, via eHealth.

In a single market without borders the increasing mobility of European citizens, whether for business or for pleasure, is a challenge and an opportunity that needs to be addressed by the Public Administrations. More and more public authorities at all levels are turning to information and communication technologies to organize and deliver services.

These technologies can contribute to providing faster, cheaper, better quality services and the possible applications of ICTs in public life, as seemingly, providing that potential users have the means and the ability to access such services.

For regional and local authorities in particular, being close to the citizens and to businesses means developing and offering new electronic services that kite out better to all citizens' need, including those from vulnerable and disadvantage groups or also living economically depraved and remote areas.

Interoperability is a must, if we want all this to become possible. It is also essential to have good quality reliable and widespread networks, that provide broadband for all.

Interoperability has a technical and an organizational component, of course but it needs a kind of political support, you are demonstrating with the organization of this Vertice, in order to promote public and private investment, in developing the technology that will enable different information systems to talk to each other, in providing the best ways to exploit ICTs to support economic growth, and the delivery of eGovernment services across regions and member states, in innovating and encouraging new types of services.

Ladies and gentleman, I look forward to your conclusions concerning new interoperability priorities and development of forms of cooperation between regional national and European level of government and administration.

Let's continue to work together, so that the information society brings full benefits to the quality of life of European citizens, businesses and consumers alike. Grazie."

ESIIG 2 Co - hosted events

In order to develop new synergies and create contacts with representatives of the European Commission, of the national and regional governments of Europe, of the research field, the Academia and experts of the ICT sector ESIIG 2 hosted two important parallel events, one organized by the CEN, European Committee of Standardization, on discovery of and access to eGovernment resources, in October, Monday 20st, and another interesting co-hosted event organized by INTEROP-VLab, on Enterprise/Administration Interoperability and local development, in October, Tuesday 21st.

Esiig 2 Co-Hosted event organized by Cen

As far as the CE event is concerned, it is obvious that eGovernment will be a major cost saver governments across Europe as well as key competitive factor.

Less obvious is how existing eGovernment resources - services, documentation, standards, processes etc... - can be used and reused with maximum benefit for the common good, particularly across political-administrative boundaries.

Discovery of and access to services is often difficult, often for sheer lack of classification, correct terminology or missing descriptions of services (in a wide sense), but also for lack of language or other semiotic skills.

Current obstacles to widespread access to and reuse of eGovernment resources also include:

- Lack of a comprehensive, easy to use standardized metadata scheme for their description.

- Lack of easily accessible administrative terminology for use in these descriptions.

- Lack of awareness of cultural diversity issues including users' language skills and other semiotic faculties.

This workshop enhanced existing activities in these areas and formulated recommendations in a multi-part CWA (CEN. Workshop Agreement).

Esiig 2 Co-Hosted event organized by Interop – Vlab

As far as the second event is concerned, INTEROP-VLab represented the "European virtual laboratory for Enterprise Interoperability", officially created as an AISBL (Association Internationale Sans But Lucratif) under the Belgian law.

INTEROP-VLab has stemmed from the Network of Excellence INTER-NoE (Interoperability Research for Networked Enterprise Applications and Software), coordinated by University of Bordeaux 1 with 47 partners and more than 300 researchers.

The mission of INTEROP-VLab was to consolidate, develop and durably maintain the new European research community founded by the INTEROP-NoE in its three years and half of intense integrating, joint research and dissemination – activities in the domain of Enterprise Interoperability.

The Programme

The programme was composed by a wide spectrum of sessions, based on a common matter: interoperability and its different contests of analysis.

Every session was composed by a topic and a related critical issue.

The first day the sessions focused on the creation of the European Knowledge Society, based on the common progress concerning the themes that contribute to solve effectively the concrete problems of European citizens, with respect of all the principles and values of freedom and plurality that facilitate the protection and promotion of a cultural, ethnic and linguistic diversity.

It has been analyzed the European Interoperability Framework for i2010, taking into consideration the "i2010" initiative as strategic framework for the 2007-2013 period, defining the general guidelines of the European Union in the ICT field and promoting a competitive and open economy.

Moreover, it has been underlined that Interoperability became the common means for the coordination and integration strategy of different information systems and collaboration amongst the European administrations, allowing to realize, in 2010, all the principles and objectives of a Common Intelligent Government, which could facilitate the Knowledge Economy and a better European integration.

Another important theme discussed during the first day, was the broadband: the i2010 initiative proposes, in fact, the broadband challenge to supply and integrate services and quality contents, making them faster and more innovative.

Finally, the last session of the first day analyzed the way in which Regions face and regulate the challenges for the development of interoperability and how they focus the efforts and resources of the public sector for the enlargement of the e-Government services.

The second day, the sessions have been dedicated to the analysis of the multidimensional aspect of interoperability that, at the same time, concerns organizational, semantic and technical aspects.

Nowadays, the main challenge is to make easier and more concrete the opportunity of working in cooperation.

For this reason, in fact, an important space has been dedicated to interoperability among different administrations, supporting the cooperation among various levels and facing all the circumstances where requested.

Another important theme dealt the second day, has been the relation between interoperability and open standards.

In this session has been discussed the way in which the adoption of open standards can allow the development of interoperability among different systems made by different owners and how none of them is predominant on the others.

Finally, in the last session has been analyzed the relationship between interoperability and the ICAR Project, (Interoperability and Cooperative Application among regions), taking into consideration the experience in the Italian regions and the role of Cisis, (Interregional Centre for the informatic, geographic and statistic systems) for the SPC, Public System of Connectivity.

The third day, finally, the sessions have been focused on the development of interoperability laboratories, taking into consideration the way in which information are delivered, shared, elaborated and used.

In a globalized world, in fact, the national and regional levels of the European Union must be open to dialogue with not EU countries.

In order to ensure this dialogue, interoperability represents a key element to promote an exchange and an updating of all the information that allow to deliver services to the citizens and to the companies both for the economic growth and for their own safety.

These sessions have been dedicated to the dialogue and the comparison amongst the different regions of the world and the different experiences related to the European Community.

ESIIG2 Supporters

MADAME VIVIANE REDING. The event is organized under the patronage of Mrs Viviane Reding, the European Commissioner of the Information Society and Media.
http://ec.europa.eu/commission_barroso/reding/index_en.htm

i2010: the European IGovernment Action Plan. i2010 is the current strategic framework of the European Commission that defines the most important guidelines for the Information Society and Media. This is a comprehensive strategy for modernising and encouraging the growth and the creation of employment.
http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm

CISIS: Italian Interregional Center for the Information and Statistical System. Cisis is an Association between the Regions and autonomous Provinces created to ensure an effective coordination of informative and geographical elements and Statistical Information, and to ensure the best connection among regions, the Government and local authorities. www.cisis.it

ePRACTICE.EU is a European portal created from the merge of the eGovernment Observatory and the Good Practice Framework, with the aim of offering a good service for the professional community of eGovernment, eHealth and eInclusion. This is an interactive initiative mainly focused on good practice sharing that allows to the users to discuss and influence the way in which the public administrations operate. www.epractice.eu

SEMIC.EU. The website was realized to become a point of reference for the semantic interoperability in Europe. It is a web space that allows the sharing of resources in the field of interoperability. www.semic.eu

CEN: European Committee for Standardization. Is a co hosted event that will have its own specific session during the first day of the Summit. www.cen.eu

INTEROP VLAB. The European virtual laboratory for Enterprise Interoperability is a co hosted event that will have a specifically dedicated session the second day of the Summit. www.interop-vlab.eu

IDABC - Interoperable Delivery of eGovernment Services to public Administrations, Business and Citizens. IDABC stands for Interoperable Delivery of European eGovernment Services to public Administrations, Businesses and Citizens. It uses the opportunities offered by information and communication technologies to encourage and support the delivery of cross-border public sector services to citizens and enterprises in Europe, to improve efficiency and collaboration between European public administrations. http://ec.europa.eu/idabc/

The Regional Ministry for consumer protection and administrative simplification

and

The Technical and Scientific Committee

The Regional Ministry for consumer protection and administrative simplification

REGIONE LAZIO

The Regional Ministry for Consumer Protection and Administrative Simplification aims at informing and protecting citizens, and making regional services more accessible and efficient for consumers, companies and other Institutions in the Lazio Region.

It's main objective is to protect citizens' rights and improve quality of life. In this modernization process, eGovernment plays a crucial role in bridging the digital divide, simplifying administrative procedures, allowing real time data and information exchange so that no citizens are left behind.

Among the others, the following are the main priorities of the Regional Ministry:

• Defining the technological framework of the Regional Information System (SIR).

• Developing new digital networks in order to involve small villages.

• Simplifying administrative procedures.

• Implementing multi-channel systems and creating new thematic portals for citizens.

• Carrying out of information and training activities on consumer protection.

LAit LAZIO innovazione tecnologica

The Regional Ministry for Consumer Protection and Administrative Simplification carries out all eGovernments and Administrative Simplification activities and projects through LAit S.p.A., the ICT company of the Lazio Region.

LAit coordinates the e-government projects co-financed by the Italian Ministry.

LAit wants to promote the use of ICT tools and the development of management information systems in order to provide better public services to citizens at regional level. It develops the infrastructure projects concerning territorial networks and services and also provides regional local administrations with organizational consulting.

LAit is engaged in developing and supporting regional working groups to participate in European projects in the field of information society. This will allow the development of new and improved public services as well as a boost in cutting edge research in the field of Information Technology.

Administrative and bureaucratic oppositions, as well as the lack of a strong political and strategic mandate have prevented LAit from carrying out all the activities foreseen by the law and as a consequence company's initiatives have developed patchily, without a unified design and are therefore ineffective.

It is important to foster the idea of an agency for regional information able to implement an innovation governance within the region of Lazio.

The Technical and Scientific Committee

The Technical and Scientific Committee for the second edition of the ESIIG Summit was constituted with the aim of:

• Establishing an advisory and support body in order to guarantee a quality organization for the Second Summit.

• Proposing initiatives for the enhancement of interoperability related issue amongst European regions to be presented during the Second Summit.

Structure of the Technical and Scientific Committee

The Presidency of the Committee is assigned to the Regional Ministry of the Lazio Region, while the Vice-presidency is assigned to the Regional Ministry of the Region that hosted the previous edition of the Summit. The work of the technical members of the Committee has been to support the Organizing Secretariat coordinated by the Team of ESIIG 2, activated by the Regione Lazio in-house company, LAit S.p.A. The Technical and Scientific Committee is composed both by speakers and chairmen of the Interim Conference of October 2007 and by national and European relevant experts in the field of Interoperability.

```
         ┌──────────────────────────────────┐              ┌──────────────┐
         │   Presidency (Regione Lazio)     │──────┐        │  Organizing  │
         └──────────────────────────────────┘      │        │ Secretariat  │
                          │                         │        │   ESIIG 2    │
         ┌──────────────────────────────────┐      │        │ (LAit S.p.A.)│
         │ Vice Presidency (Generalitat      │──────┤        └──────────────┘
         │          Valenciana)             │      │
         └──────────────────────────────────┘      │
                          │                         │
┌────────────────────┐  ┌──────────────────────────┐
│ Speakers and       │──│ National and European     │─────┘
│ Chairmen of the    │  │ experts in the field of   │
│ Interim Conference │  │ Interoperability          │
│ (October 2007)     │  └──────────────────────────┘
└────────────────────┘
```
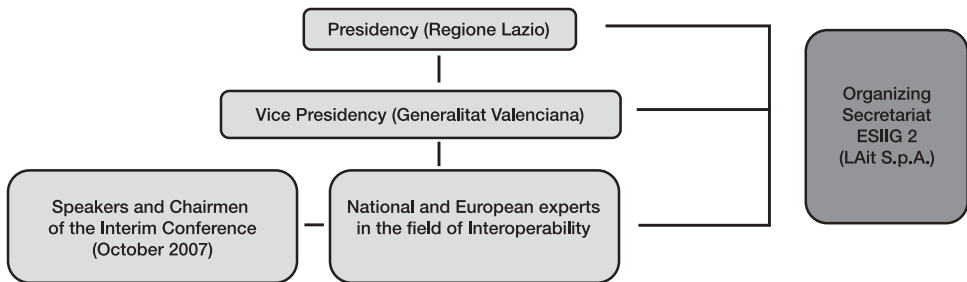
What does the Committee do?

The Committee had the task to evaluate and select the proposals of papers presented during the Second Summit in 2008: moreover, the Committee evaluated all the projects and initiatives presented and awarded the iG 2.0 prize.

The main objective of the Prize iG 2.0 has been to enhance the best initiatives in the field of interoperability in the iGovernment on a local, regional, national and European level. The evaluation criteria, in line with the procedure carried out during the first ESIIG, have been the following: level of innovation, concrete results, impact and transferability.

Important and innovative initiatives of ESIIG 2

Important and innovative initiatives of ESIIG 2

In the organization of this Summit, one of the most important aim was to involve and collaborate with the other European regions, with the stakeholders active in the field, the representatives of the European Commission, of the national and regional governments of Europe, of the research field and experts of the ICT sector, the European Institutions. Some important and innovative initiatives characterized ESIIG 2, among which:

Call for Papers: On the occasion of the Second Summit on Interoperability in the iGovernment, ESIIG 2, the Technical and Scientific Committee and the Organizing Secretariat of ESIIG 2 invited all those interested in contributing effectively to the event, to produce their own paper and submit it to the assessment of the Technical and Scientific Committee composed by representatives of the ICT, Public Administration and the Research field. All Papers that received a positive evaluation have been published in the Official Summit Proceedings (and on the event website www.esiig2.it) and in the Agora. Only original papers have been released. Intellectual contents of each Paper remain of the sole property of the author. The Call for Papers has been one of the most important initiatives promoted by the Summit. Our team promoted and sponsored this initiative at a European level, spreading dissemination activities with the purpose to involve every Member State. We received important and high profile contributions.

Agora: The Agora facilitated and will continue to stimulate the meeting within the ESIIG 2 community before, during and after the Summit. Moreover, the Agora allows experts of the ICT field to visualize and discuss the papers selected by the Technical and Scientific Committee with the respective authors. The authors of the proposals published on-line, who will be attending the Summit, can make themselves available to meet other participants who are interested in meeting them to discuss the paper they submitted. The meetings organized during the Summit have been held in English. The Organizing Secretariat of ESIIG 2 arranged the meetings parallel to the development of the summit. It was a very important initiative to facilitate the meeting, dialogue and debate amongst the Summit attendees and aimed at developing experiences, synergies and knowledge.

iG 2.0 Award: Another important initiative promoted at a European level, with the collaboration of the European Union, e-Practice, was the iG 2.0 Award, who had the main objective of sharing the current best practices in the field of interoperability in the public eGovernment at local, regional, national and European level. The Award was open to a wide spectrum of participants, from public authorities at local, regional, national and European level up to stakeholders of the private sector experts in ICT field and in the Knowledge and Information Society. The Members of the ESIIG 2 Technical and Scientific Committee, evaluated and selected the winner of the iG 2.0 Award.

The Prize has been awarded during the Second Summit. Previously to the celebration of the Summit, the Organizing Secretariat published a list with the finalists among which the Technical and Scientific Committee selected the winner.

Forum: The ESIIG 2 Forum is a on-line participation tool provided by Regione Lazio to allow European stakeholders active in the field of eGovernment to contribute and establish the new priorities of interoperability in Europe. The document available for discussion is the Interoperability Declaration, presented during the First European Summit on Interoperability in the iGovernment, celebrated in Valencia, in November 2006. In fact, it is possible to discuss and comment on the articles of the Interoperability Declaration presented during the First European Summit on Interoperability in the iGovernment, through the Forum and send your comments, suggestions, proposals to make the Declaration a representative document for all needs, priorities and existing conditions concerning interoperability, which are different from country to country and from region to region. It is possible to send comments in the following sections of the Declaration: "priorities" and "conclusions". It is also possible to propose "new priorities" in the homonymous section . Comments can be sent in the following languages: Italian, English, French and Spanish.

Publication of the Call for Papers Results

Publication of the Call for Papers Results

The ESIIG2 Organizing Secretariat organized a Call for Papers, with the aim to put in common the current practices in the field of interoperability in the European eGovernment at local, regional, national and European level. All the Papers submitted during the Second European Summit in 2008 and published on the Summit Official Proceedings have been evaluated by the Technical and Scientific Committee, composed both by speakers and chairmen of the Interim Conference of October 2007 and by national and European relevant experts in the field of Interoperability. The following papers have been focused on the actions, plans, projects and initiatives in the field of the interoperability in the eGovernment, and on the difficulties as well as about the difficulties and priorities to face in order to reach a unique interoperable iGovernment in Europe. The following are the papers selected for the publication on the ESIIG 2 Official Proceedings and on the website:

- T-SENIORITY – eINCLUSION AND INTEROPERABILITY by *Alejandro Echeverria*;

- SECURITY AND PRIVACY PRESERVING DATA IN eGOVERNMENT INTEGRATION by *Claudio Biancalana* and *Francesco Saverio Profiti*;

- PROPOSAL FOR INTEROPERABILITY BETWEEN PUBLIC UNIVERSITIES by *Juliá Estrella D. Correcher*;

- A CROSS-APPLICATION REFERENCE MODEL TO SUPPORT INTEROPERABILITY by *Elena Baralis, Tania Cerquitelli, Silvana Raffa*;

- APPLYING SOA TO MOBILE SECURE EGOVERNMENT SERVICES - THE SWEB APPROACH by *Silke Cuno, Yuri Glickman, Petra Hoepner, Linda Strick*;

- AN IDENTITY METASYSTEM APPROACH TO IMPROVE eID INTEROPERABILITY AND ASSURE PRIVACY COMPLIANCE by *Andrea Valboni*;

- TOWARDS INTEROPERABLE INFRASTRUCTURES OF GEOSPATIAL DATA by *Sergio Farruggia, Emanuele Roccatagliata*;

- MODERNIZATION AND ADMINISTRATIVE SIMPLIFICATION MASTER PLAN FOR THE LOCAL COUNCILS OF THE REGION OF MURCIA by *Leandro Marín Muñoz, Pedro Olivares Sánchez, Isabel Belmonte Martinez*;

- ORGANIZATIONAL INTEROPERABILITY AND ORGANIZING FOR INTEROPERABILITY IN eGOVERNMENT by *Ralph Cimander, Prof. Dr. Herbert Kubicek*;

- THE NATIONAL INTEROPERABILITY FRAMEWORK: A NEW REGULATORY TOOL TO GUARANTEE INTEROPERABILITY AMONG SPANISH PUBLIC ADMINISTRATIONS by *Agustí Cerrillo*;

- THE REALIZATION OF THE GREEK E-GIF by *Andreas Papadakis, Kostas Rantos, Antonis Stasis*;

- BUILD GOVERNMENT INTEROPERABILITY THROUGH OPEN STANDARD TECHNOLOGY by *Goodwin Ting, Anne Rasanen, Marco Pappalardo*;

- TOWARDS AN INTERCULTURAL REPRESENTATION OF MEDITERRANEAN INTANGIBLE CULTURAL HERITAGE (ICH). AN XML INTEROPERABILITY FRAMEWORK FOR REGIONAL ICH DATABASES by *Jesse Marsh, Francesco Passantino*;

- CASTILE AND LEON, A MODEL OF INTEROPERABILITY by *Isabel Alonso Sánchez, Antonio Francisco Pérez Fernández, José Ignacio de Uribe Ladrón de Cegama, Jorge Ordás Alonso*.

The papers selected for the publication on the ESIIG 2 Official Proceedings, on the website AND for the participation in the Agora have been:

- THE CATALAN INTEROPERABILITY MODEL by *Ignasi Albors*;

- IDENTITY AND RESIDENCE VERIFICATION DATA SYSTEM by *Nimia Rodríguez Escolar, José A. Eusamio Mazagatos*;

- FROM EXTENDED ENTERPRISE TO EXTENDED GOVERNMENT: REGIONE LAZIO INTEROPERABILITY AND eGOVERNMENT POINT OF VIEW by *Claudio Biancalana, Dante Chiroli, Claudio Pisu, Francesco Saverio Profiti, Fabio Raimondi*.

T-Seniority: E-inclusion and Interoperability

Alejandro Echeverria
Idi Eikon
Project Manager
Valencia, Spain
email aecheverria@idieikon.com

Abstract

In this paper, we describe the T-SENIORITY PROJECT, a CIP Project approved by the EC which aims to significantly improve quality of life and ensure efficient health and social care for the ageing population by specifying and demonstrating innovative ICT enabled products and services.

Keywords

e-Inclusion, t-government, e-government, Digital TV, integration, interoperable, accessibility, availability.

Introduction

T-SENIORITY is based on the **integration of digital services addressed to elders and info-marginated audiences that will be accessed by TV channels** and where the important segment of people already acquainted with the TV remote control can be included in the digital society and benefit from it.

T-Seniority main *target* is a "*user-centric*" **integration of services** *throughout TV*, especially assistance programs (including *trans-borders services*) for disadvantaged social groups, focusing mainly in *older* people and "*early stages of getting older*" people, to cover a diverse range of care needs in a wide range of service modalities (home care, tele-assistance, mobile telecom services, tele-alarms, nursing services….).

It is **a new service provision model that will use digital TV** as the most widely available and preferred channel for *info-marginated* sectors, helping to reach *difficult-to-reach* audiences, such as "*disabled people getting older*", who may have less access to other forms of digital technology, improving current situation and affording the demands of a growing elderly population.

Digital inclusion is, therefore, **social inclusion with an ICT TV stream**.

It emphasises the ***digital inclusion*** *through TV* in Prevention and Early Action side of the Social Care, in order to avoid undesirable situations or to correct them at the shortest time.

25

According to this, is a set of integrated *care e-Service throughout TV* oriented towards the *Elders* (and/or *dependent* people), and their *Informal* Carers. Informal Carers play an important part in the lives of many elderly people. supports these carers as well as the sufferers themselves, because, in many cases they are also *info-marginated*.

THE PROJECT

T-SENIORITY is based on the integration of digital services addressed to elders and info-marginated audiences that will be accessed by TV channels and where the important segment of people already acquainted with the TV remote control can be included in the digital society and benefit from it.

T-Seniority is a set of integrated care e-Service throughout TV oriented towards the Elders (and/or dependent people), and their Informal Carers. Informal Carers - both families and neighbours carers - play an important part in the lives of many elderly people. T-Seniority supports these carers and families, as well as the sufferers themselves, because, in many cases they are also info-marginated.

Other stakeholders (formal careers, local government administrations, socio-political and economic players, service providers, etc...) can keep holding the interaction with older people using the conventional means (Internet web browsers through PC, PDA, mobile phones…) for providing or monitoring the services and for the control, evaluation and improvement of mechanisms within the whole Offer of Social Care e-Services.

By deploying a Care e-Services platform like this, T-Seniority ensures the creation of a virtuous circle of elder's independent living empowerment services[1].

T-Seniority offers a flexible combination of General Public e-Services and Personalised e-Care Services demonstrating the versatility of its technological platform according to the user's preferred or available ICT media.

But T-Seniority services are not only "multi-modal" over interactive TV alternatives. T-Seniority is also able to deal with complementary communication channels following user journeys across a sea of devices and services to create a continuous "human" experience, such as mobile solutions for tele-alert management or touch-screens devices for demanding services, contributing to increase older people independent living. In many cases this multi-channel feature of T-Seniority (TV, PC, Mobiles, tactile devices…) makes possible to extend the participation of other stakeholders (better acquainted in the use of other ICT devices) inside the circle of services provision to older people.

NOTES
[1] See figure T-SENIORITY Virtuous Circle

T-SENIORITY Virtuous Circle for Empowering Independent Living
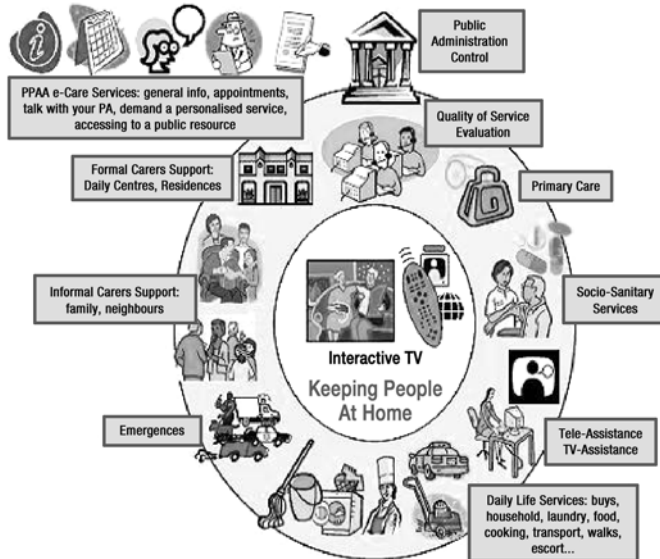
The User in the Middle of e-Care Services Provision
T-SENIORITY promoting integration of efforts, persons and e-Care Services resources

THE TECHNOLOGY

T-Seniority is a multi-modal platform that works over different iTV alternatives, ensuring a wide deployment potential of its services at the same time: DTT (Digital Terrestrial TV), IPTV (Internet Protocol TV), IPHN (Internet Protocol Home Networking TV). IPHN is deployed by plugging small media centres (mini-PCs, Play Station or Wii devices, for example) to a TV screen. Then, normal TV broadcast can be naturally integrated with very interactive and personalised (at local level or at personal level) services.

Not all the care e-Services can be reached using any TV technology, because it depends of the level of interactivity of each TV delivery mechanism. However, T-Seniority uses the same "User-friendly interfaces" for all sorts of TV systems, taking into account that many elderly people have impairments in vision, hearing, mobility or dexterity and without forgetting the informal Carers.

TV interactivity is inversely proportional to the impact that has on target users. Interactivity is enabling a wide range of activities that rely on two-way contact: personal communication, messaging, data sharing, shopping, trading, gaming... is a user's centre-stage solution using TV is as an ideal vehicle over which to provide interactive and personal communications services that can be found on PCs, but are beyond the reach of many residents. In T-Seniority different applications and services can work together – 'interoperate' (e.g. ambulant services, care at home) and solutions are able to adapt to the needs of individual groups and to their changing needs over time.

Diagram 2: IMPACT vs INTERACTIVITY
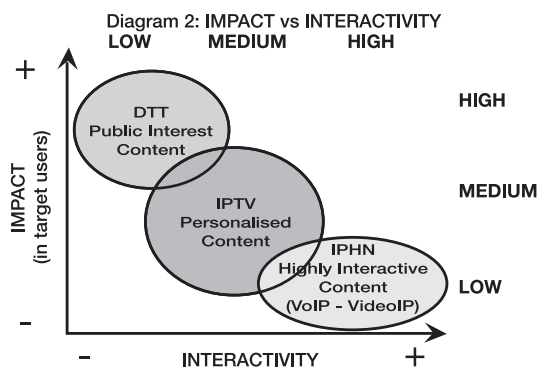
T-Seniority *behavior* changes according to the level of interactivity. Using a unique technological platform, T-Seniority is able to offer its Care e-Services adapting them to the features of each Interactive TV modality *(see Figure 2)*.

EUROPEAN APPROACH

T-Seniority embraces all the critical "success factor" keys considered in EICTA ICT "White Paper of Inclusion"[2] as the main risks exclusion:

• *Availability*: People disadvantaged due to lack of geographical coverage.

• *Affordability*: People do not have access due to a lack of resources. Either the average income of a potential consumer is too low or it is not profitable to provide service due to actual operating costs.

• *Accessibility*: This has two elements: 1) people with disabilities such as visual, audio, speech, cognitive or mobility related 2) people who are lacking in ICT skills.

To tackle properly these issues is considered by **T-Seniority** Consortium as the most outstanding *added value for users*. According to this, two highly relevant "***facts***" will leverage the deployment of **T-Seniority** care e-Services in Europe. This is, most of the *target* end-users (*older people* and *ageing people*):

• ***have access*** to TV STB (small investments *directly* or *indirectly* done, previously to offer): ***Availability*** and ***Affordability***. In the digital context, *television mass nature* is considered a basic access point to the Information Society, a tool to fight against the *digital divide*. Opposite to computers, which are *still lacking* in many European households, television sets are present in almost every living-room;

• and ***are acquainted*** to use *remote control* to make decision according to their own preferences: ***Accessibility***. In this context, **T-Seniority** wants to bring *simplicity* to *users* as the ***first step towards digital engagement***.

NOTES

[2] EICTA: European Information & Communications Technology Industry Association. i2010: Toward an Inclusive Information Society. ICT industry White Paper on inclusion. Brussels December 2006. The six key factors are: 1- Affordability 2- Accessibility 3- Availability 4- Fostering an enabling public sector environment 5- Integrating ICT & Inclusion 6- Strengthening stakeholder collaboration. Here we focus in the first three

INNOVATION IN T-SENIORITY

The main innovative aspects of **T-Seniority** are:

- The ***absolute independence*** of service from the media. This is, **T-Seniority** is *multi-channel*, presenting different users interfaces according to *interactivity capabilities*, but all of them *sharing* the same back-office.

- The capability to **integrate** present and future-emerging care e-Services (*business* side) *throughout TV screen* for independent living, **combining** (making interoperable) different branches of TV provision technologies (*technical* side).

   Its ***Integration*** capabilities of:

   - ***Technologies***: "*born to cooperate*" with existing services and departing from Information Society technology standards.

   - ***Services***: it creates Local, Regional and National Administration accredited and controlled multi-services networks.

   - ***Users***: Includes the full chain of stakeholders (elder, families, carers, Administrations, inspections agencies, providers, ...).

   - ***Persons***: it goes beyond the one-to-one; allows the communication from one to many in real time, from the elder to many to improve the efficiency of the service and the response time.

- It is ***multilingual, non-location-dependent*** and ***trans-border***. It is customizable to any European language and cross national borders. This is, **T-Seniority** can be targeted at anything from a few households to the entire world. For example, one *local* DTT broadcaster in Spain launches the MHP version through the Carousel (multiplex) and a UK elder resident in Spain will receive his/her *personalized* set of services through the return channel from some UK providers in English.

- ***Available on-demand***: as opposed to traditional broadcast content which is available only at a particular time on a particular channel; they are not *frequency dependable*, they do not need to broadcast on frequencies that will become unavailable in the medium term.

- ***Personalised***: allowing audiences to select the content that appeals to them and repackage it in the way that works best for them. Its ***flexibility and easy of use***:

   - It is ***Internet***, can be use from anywhere at any time, it generates information of utility for all the users that will reach them through different communication channels (Web, SMS, e-Mail, Voice, Image).

   - It is ***intuitive***: it uses visual metaphors and hides the technology behind TV remote control, touch screens, simple telephones (only 2 buttons) biometric fingerprint substituting the keyboard ... The users have validated the model as "easy to use and quick to learn".

THE CONSORTIUM

T-SENIORITY project is formed by **17 partners** from **7 Member States** of the EU: Spain, Italy, France, Finland, Cyprus, UK, Greece.

Within T-SENIORITY different profiles are involved in tasks as: management, dissemination activities, validation tasks, business development, product development and implementations., technology transfer and so on. The ICT **PSP Programme requirement** about involving *all the stakeholders in the chain of service provision* in order to assure an effective commitment to tackle the full deployment

The balanced structure between public **partners** (as the Ministry of Indutry, from Spain; the Region of Toscana, in Italy, or the City of Tampere in Finland) and **private actors** as IDI EIKON, main driver of the project and the technological provider of the e-services, will provide a strategy based on PPP (Public Private Partnership) in order to acquire the business results expected from the EC.

CONCLUSION

T-Seniority wants to be an outstanding *Public-Private-Partnership* (PPP) model in ***care e-Services*** at European scale and will help to foster the development of lead markets for innovative ICT-based solutions notably in areas of *social* public interest.

The ICT PSP will help overcome the initial hurdles hindering the development of **T-Seniority** business in support of the i2010 goals. However, in order to reach a *long term impact at European level*, the Consortium has a clear view about how to achieve a satisfactory level of *viability*, *sustainability* and *scalability* of **T-Seniority** after the end of the project and the Community funding.

Security and Privacy Preserving Data in e-Government Integration

Claudio Biancalana
Department of Computer Science and Automation,
RomaTre University
Rome, Italy
biancalana@dia.uniroma3.it

Francesco Saverio Profiti
Department of Computer Science and Automation,
RomaTre University
Rome, Italy
s.profiti@gmail.com

Abstract

In this paper, we present a security infrastructure design to ensure safety in the electronic government system: a combination of well-known security solutions, including Public Key Infrastructure, Shibboleth, Smart cards and Lightweight Directory Access Protocol. In this environment we give an overview in privacy preserving and security for Data Mining processes.

Keywords

Security, Integration, Single Sign On, Data Mining

INTRODUCTION

Member countries of the European Union are speeding into the digitalization of government services, with countries currently offering a surplus of interactive services which are increasing in availability and sophistication. International attempts to develop integrated customer oriented administrative services represent efforts to alleviate the problems of bureaucracy and improve the provision of administrative services. Since the launch of the European Strategy for the development of e-Government, with the "e-Europe 2002" initiative presented in March 2000 at the Lisbon European Council, a change of focus has occurred. The original target to supply services through the internet has evolved into the impact of e-Government programmes in delivering better services to their citizens, more efficient in an inclusive society" which emphasizes on the quality of the services provided and the extent to which online services are meeting user needs. Identified as a major aspect, is the safe access to services European Union wide by establishing secure systems for mutual recognition of national electronic identities for public administration websites and services (European Commission, 2006).

The necessity of an interoperable and scalable security and identity infrastructure has been identified by all implicated parties focusing on the effectiveness of solutions provided.

SECURITY AND ELECTRONIC GOVERNMENT

Electronic Government services are being rapidly deployed throughout Europe. Security is the main concern in this process, creating the need for an interoperable secure infrastructure that will meet all current and future needs. It is a necessity that such an infrastructure will provide a horizontal level of service for the entire system and must be accessible by all applications and sub-systems in the network.

Delivering electronic services will largely depend upon the trust and confidence of citizens. For this aim, means have to be developed to achieve the same quality and trustworthiness of public services as provided by the traditional way [10].

Regarding the level of systems design, some fundamental requirements, as far as security is concerned, have to be met:

• Identification of the sender of a digital message.

• Authenticity of a message and its verification.

• Non-repudiation of a message or a data-processing act.

• Avoiding risks related to the availability and reliability.

• Confidentiality of the existence and content of a message [10].

The best solution makes use of coexisting and complementary technologies which ensure safety throughout all interactions. Such a system provides assurances of its interoperability by using widely recognized standards and open source software. This evolutionary infrastructure design is based on a collaboration of existing cutting edge technologies in a unique manner. Public key infrastructure, Single sign On techniques and LDAP collaborate effectively guaranteeing efficient and secure communications and access to resources.

A Public Key Infrastructure (PKI) based on asymmetric keys and digital certificates, is the fundamental architecture to enable the use of public key cryptography in order to achieve strong authentication of involved entities and secure communication. PKI have reached a stage of relative maturity due to extensive research that has occurred in the area over the past two decades, becoming the necessary trust infrastructure for every e-business (ecommerce, e-banking, e-cryptography).

The main purpose of PKI is to bind a public key to an entity. The binding is performed by a certification authority (CA), which plays the role of a trusted third party. The user identity must be unique for each CA. The CA digitally signs a data structure, which contains the name of the entity and the corresponding public key besides other data.

Such a pervasive security infrastructure has many and varied benefits, such as cost savings, interoperability (inter and intra enterprise) and consistency of a uniform solution [1].

A PKI smart card is a hardware-based cryptographic device for securely generating and storing private and public keys, digital certificates and performing cryptographic operations.

Implementing digital signatures in combination with advanced cryptographic smart cards minimizes user side complexity while maintaining reliability and security (Only an identity in possession of a smart card, a smart card reader and the Personal Identification Number (PIN) can use the smart card).

Smart cards provide the means for performing secure communications with minimal human intervention. In addition smart cards are suitable for electronic identification schemes as they are engineered to be tamper proof.

The lightweight directory access protocol, or LDAP, is the Internet standard way of accessing directory services that conform to the X.500 data model. LDAP has become the predominant protocol in support of PKIs accessing directory services for certificates and certificate revocation lists (CRLs) and is often used by other (web) services for authentication.

A directory is a set of objects with similar attributes organized in a logical and hierarchical manner. An LDAP directory tree often reflects various political, geographic, and/or organizational boundaries, depending on the model chosen. LDAP deployments today tends to use Domain name system (DNS) names for structuring the topmost levels of the hierarchy. The directory contains entries representing people, organizational units, printers, documents, groups of people or anything else which represents a given tree entry (or multiple entries).

Single Sign On (SSO) is a method of access control that enables a user to authenticate once and gain access to the resources of multiple independent software systems. Shibboleth is standards-based, open source middleware software which provides Web Single Sign On (SSO) across or within organizational boundaries. It allows sites to make informed authorization decisions for individual access of protected online resources in a privacy preserving manner. Shibboleth is a Security Assertion Mark Up Language with a focus on federating research and educational communities.

Key concepts within Shibboleth include:

- **Federated Administration**: The origin campus (home to the browser user) provides attribute assertions about that user to the target site. A trust fabric exists between campuses, allowing each site to identify the other speaker, and assign a trust level. Origin sites are responsible for authenticating their users, but can use any reliable means to do this.

- **Access Control Based On Attributes**: Access control decisions are made using those assertions. The collection of assertions might include identity, but many situations will not require this (e.g. accessing a resource licensed for use by all active members of the campus community or accessing a resource available to students in a particular course).

- **Active Management of Privacy**: The origin site (and the browser user) controls what information is released to the target. A typical default is merely "member of community". Individuals can manage attribute release via a web-based user interface. Users are no longer at the mercy of the target's privacy policy.

A collaboration of independent technologies presented previously leads to an evolutionary horizontal infrastructure.Introducing federations in e-government, in association with PKI and LDAP technology, will lead to efficient trust relationships between involved entities. A federation is a group of legal entities that share a set of agreed policies and rules for access to online resources (Uk Federation Information Centre, 2007, http://www.ukfederation.org.uk/).

These policies enable the members to establish trust and shared understanding of language or terminology. A federation provides a structure and a legal framework that enables authentication and authorization across different organizations.

In general the underlying trust relationships' networks of the federation are based on Public Key Infrastructure (PKI) and certificates enable mutual authentication between involved entities. This is performed using SSL/TLS protocol and XML digital signatures using keys contained in X.509 certificates [11][4] obtained from e-school Certification Authorities.

An opaque client certificate can contain information about the user's home institution and, optionally, the user's pseudonymous identity. Shibboleth technology relies on a third party to provide the information about a user, named attributes. Attributes are used to refer to the characteristics of a user and not the user straightforward: a set of attributes about a user is what is actually needed rather than a name with respect to giving the user access to a resource.

In the hypothized architecture, this is performed by the LDAP repository which is also responsible for the association of user attributes.

Additionally LDAP contains a list of all valid certificates and revoked certificates. Digital signatures are used to secure all information in transit between the various sub-systems.

This infrastructure leverages a system of certificate distribution and a mechanism for associating these certificates with known origin and target sites at each participating server. User side complexity is guaranteed to be minimum without any cutbacks on the overall security and reliability.

The model presented in this paper offers the advantages of each single technology used and deals with their deficiencies through their combined implementation:

• Hybrid PKI hierarchical infrastructure delegates the trust to subordinate CAs permitting the creation of trust meshes, under a central CA, between independent organizations. Interoperability is simply addressed.

• PKI supports single sign on with the use of Shibboleth. Shibboleth coordinates with PKI to develop enhanced, complex free, authorization and authentication processes.

• The user becomes part of the designed system using Single Sign On (SSO) technology, that simplifies the access to multiple resources with only one "gain access procedure". In practice this results in enhancing the security of the whole infrastructure, among other evident technical issues, because a sufficient level of usability is assured. Providing a security infrastructure is not enough, the user must also be able to make use of the security features. Otherwise, the designed service will fail due to the fact that users' behavior is often the weakest link in a security chain.

The combination of the above mentioned techniques creates strong trust relationships between users and e-Government services, by implementing a "zero-knowledge" procedure of a very strong authorization.

Zero-Knowledge is an interactive method for one entity to prove the possession of a secret without actually revealing it, resulting eventually in not revealing anything about the entity's personal information.

The combined techniques mitigate the problem of memorizing many passwords and reduce the vulnerability of using the same password to access many web services. It is essential to distinguish the authentication process from the authorization process. During the authentication process a user is required to navigate to his home site and authenticate himself.

During this phase information is exchanged between the user and his home site only; with all information on the wire being encrypted. After the successful authentication of a user, according to the user attributes/credentials, permission to access resources is either granted or rejected.

The process in which the user exchanges his attributes with the resource server is the authorization process during which no personal information is leaked and can only be performed after successful authentication.

User Authentication is performed only once when the user identifies himself inside the trust mesh.

Once authenticated inside the trust mesh, users are not required to re-authenticate themselves. When a user navigates to a resource store inside the trust mesh, the authorization process is executed. During this process the service provider requires from the users Identity Provider to present the users access credentials.

The Identity provider, after successfully identifying the user and checking if he is previously authenticated, retrieves user credentials for the required resource. If user has not previously been authenticated, the authentication process is initialized.

The Shibboleth Identity provider contains four primary components the Attribute Authority (AA), the Handle Service (HS), attribute sources, and the local sign-on system (SSO). Shibboleth interacts with the Ldap infrastructure to retrieve user credentials.

From the Identity Providers point of view, the first contact will be the redirection of a user to the handle service, which will then consult the SSO system to determine whether the user has already been authenticated. If not, then the browser user will be asked to authenticate, and then sent back to the SP URL with a handle bundled in an attribute assertion.

Next, a request from the Service Provider's Attribute Requester (AR) will arrive at the AA which will include the previously mentioned handle.

The AA then consults the ARP's for the directory entry corresponding to the handle, queries the directory for these attributes, and releases to the AR all attributes the requesting application is entitled to know about that user.

PRIVACY PRESERVING DATA MINING

In large intra-organizational environments, data are usually shared among a number of distributed databases, for security or practicality reasons, or due to the organizational structure of the business. Data can be partitioned either horizontally, where each database contains a subset of complete transactions ([6]; [5]), or vertically, where each database contains shares of each transaction. The role of a data warehouse is to collect and transform the dispersed data to an acceptable format, before they will be forwarded to the Data Mining (DM) subsystem. Such central repository raises privacy concerns, especially if it used in an inter-organizational setting where several entities, mutually untrusted, may desire to mine their private inputs, both securely and accurately. Alternatively, data mining can be performed locally, at each database (or intranet), and then the subresults be combined to extract knowledge, although this will most likely affect the quality of the output.

If a general discussion was to be made about protecting privacy in distributed databases, we would point to the literature for access control and audit policies, authorization and information flow control (e.g., multilevel and multilateral security strategies), security in the application layer (e.g., database views), and Operating Systems security among others. However in this paper we assume that appropriate security and access control exist in the intra-organizational setting, and we mainly focus on the inter-organizational setting where a set of mutually untrusted entities wish to execute a miner on their private databases. As an alternative layer of protection, original data can be suitably altered (*e.g. randomized*) [2] or *anonymized* before given as an input to a miner, or queries in statistical databases may be. The problem with data perturbation is that in highly distributed environments, preventing the *inference* of unauthorized information by combining authorized information is not an easy problem [3]. Furthermore, in most perturbation techniques lies a *tradeoff* between protecting privacy of the individual records and at the same time establishing accuracy of the DM results [11].

At a high abstraction level, the problem of privacy preserving data mining between mutually untrusted parties can be reduced to the following problem for a two-party protocol: Each party owns some private data and both parties wish to execute a function F on the union of their data without sacrificing the privacy of their inputs [9].

In a DM environment, for example, the function F could be a classification function that outputs the class of a set of transactions with specific attributes, a function that identifies association rules in partitioned databases, or a function that outputs aggregate results over the union of two statistical databases.

In the above distributed computing scenario, an "ideal" protocol would require a trusted third party who would accept both inputs and announce the output. However, the goal of cryptography is to relax or even destroy the need for trusted parties.

Contrary to other strategies, crypto mechanisms usually do not pose dilemmas between the privacy of the inputs and the accuracy of the output. In the academic literature for privacy preserving data mining, following the line of work that begun with Yao [12], most theoretical results are based on the Secure Multiparty Computation (SMC) approach (e.g. [6]; [5]). SMC protocols are interactive protocols, run in a distributed network by a set of entities with private inputs, who wish to compute a function of their inputs in a privacy preserving manner.

We believe that research for privacy preserving DM could borrow knowledge from the vast body of literature on secure e-auction [8] and e-voting systems [7]. These systems are not strictly related to data mining but, they exemplify some of the difficulties of the multiparty case (this has been pointed out first by [9] but it only concerned e-auctions, while we extend it to include e-voting systems as well). Such systems also tend to balance well the efficiency and security criteria, in order to be implementable in medium to large scale environments. Furthermore, such systems fall within our distributed computing scenario and have similar architecture and security requirements, at least at our abstraction level.

In a sealed bid e-auction for example, the function F, represented by an auctioneer, receives several encrypted bids and declares the winning bid. In a secure auction, there is a need to protect the privacy of the losing bidders, while establishing accuracy of the auction outcome and verifiability for all participants. Or, in an Internet election, the function F, represented by an election authority, receives several encrypted votes and declares the winning candidate. Here the goal is to protect the privacy of the voters (i.e., unlinkability between the identity of the voter and the vote that has been cast), while also establishing eligibility of the voters and verifiability for the election result.

During the last decade, a few cryptographic schemes for conducting online e-auctions and e-elections have been proposed in the literature.

Research has shown that it is possible to provide both privacy and accuracy assurances in a distributed computing scenario, where all participants may be mutually untrusted, without the presence of an unconditionally trusted third party.

CONCLUSIONS

Internationally numerous governments are becoming available online every day. As unattached efforts of addressing electronic government are implemented globally, the need for an interoperable horizontal security infrastructure is stressed.

The effective security infrastructure design presented in this paper is a solution which makes use of coexisting and complementary open source technologies and standards. Provides secure and effective communication supported by ease of use for the end user. Scalability and interoperability is an advantage of this design suitable to meet the needs of electronic government.

In this environment we studied the context of DM security; of course, further research is needed to choose and then adapt the specific cryptographic techniques to the DM environment, taking into account the kind of databases to work with, the kind of knowledge to be mined, as well as the kind of specific DM technique to be used.

REFERENCES

[1] Carlisle Adams, Sharon Boeyen: UDDI and WSDL extensions for Web service: a security framework. XML Security 2002: 30-35

[2] Agrawal, Ramakrishnan Srikant: Privacy-Preserving Data Mining. SIGMOD Conference 2000: 439-450

[3] Domingo-Ferrer, Antoni Martínez-Ballesté, Francesc Sebé: MICROCAST: Smart Card Based (Micro)Pay-per-View for Multicast Services. CARDIS 2002: 125-134

[4] Pho Duc Giang, Le Xuan Hung, Sungyoung Lee, Young-Koo Lee, Heejo Lee: A Flexible Trust-Based Access Control Mechanism for Security and Privacy Enhancement in Ubiquitous Systems. MUE 2007: 698-703

[5] Murat Kantarcioglu, Chris Clifton: Privacy-Preserving Distributed Mining of Association Rules on Horizontally Partitioned Data. DMKD 2002

[6] Yehuda Lindell, Benny Pinkas: Privacy Preserving Data Mining. J. Cryptology 15(3): 177-206 (2002)

[7] L. Mitrou, Dimitris Gritzalis, Sokratis K. Katsikas: Revisiting Legal and Regulatory Requirements for Secure E-Voting. SEC 2002: 469-480M. Naor and B. Pinkas, Computationally Secure Oblivious Transfer, Advances in Cryptology: Proceedings of Crypto 1999.

[8] M. Naor and B. Pinkas, Computationally Secure Oblivious Transfer, Advances in Cryptology: Proceedings of Crypto 1999.

[9] Benny Pinkas: Cryptographic Techniques for Privacy-Preserving Data Mining. SIGKDD Explorations 4(2): 12-19 (2002)

[10] Roland Traunmüller: Electronic Government, Second International Conference, EGOV 2003, Prague, Czech Republic, September 1-5, 2003, Proceedings Springer 2003.

[11] Wei Wang, Guosun Zeng, Mingjun Sun, Huanan Gu, Quan Zhang: Factoid Mining Based Content Trust Model for Information Retrieval. PAKDD Workshops 2007: 492-499

[12] Andrew Chi-Chih Yao: How to Generate and Exchange Secrets (Extended Abstract) FOCS 1986: 162-167

Proposal for Interoperability Between Public Universities

Technology Platform For The Diffusion Of Information About The Technological Portfolio Of Valencian Public Universities: Covatri (Valencia Region Research Results Transfer).

Correcher E.
Universidad Politécnica de Valencia, Spain
email: escorju@upvnet.upv.es

Author
Estrella D. Correcher Juliá.

B.A. Degree in Public Administration and Management (GAP) at the Universidad Politécnica de Valencia (UPV), and currently a full-time member of staff at the Centre for Innovation, Research and Technology Transfer (CTT) at the UPV.

KEYWORDS

Management and knowledge transfer from Public Administrations. Technology platforms. Interoperability.

ABSTRACT

This paper has been researched as part of the author's bachelor thesis – directed by Professor Fernando Polo Garrido at the UPV and given public exposition on 30 March 2007. The bachelor thesis was a comparative study based on benchmarking techniques applied to Research Results Transfer Offices (OTRIs) in public universities in the Spanish regional state of Valencia. The study being extended to a selection of Spanish public university OTRIs in the area of research results management.As a result of the comparative study, management weaknesses were detected in the following areas: intangibles, processes, and users or results in society. Proposals for improvement were made – one of the proposals offering an interoperability solution involving the creation of a platform for technological information diffusion (COVATRI) by integrating the technological portfolio from public universities at a regional level. It is worth emphasising that this proposal was included in a bachelor thesis which was awarded second prize by the jury of the Sixth Archimedes Introduction to Scientific Research Prize (VI Certamen Arquímedes de Introducción a la Investigación Científica) organised by the Ministerio de Educación y Ciencia in Spain in November 2007.Three papers were produced from the bachelor thesis and submitted to the Tenth Conference on Modernising Public Administrations TECNIMAP (X Jornadas de Modernización de las Administraciones Públicas) held in Gijon, Spain, in November 2007. Two of the papers were accepted and published. One of these papers was published within the conference

theme: 'Cooperation and Interoperability Schemes between Public Administrations' with the title: 'A technology platform for the diffusion of information about the technological portfolio of Valencian public universities: COVATRI. The above article was taken as a reference in the preparation of this paper – which includes a proposal for improvement and describes the background and methodology used in the analysis of the management of research results as applied by Spanish Research Results Transfer Offices (OTRIs). The advantages are then given for implementing the described technological platform. Finally, the conclusions are presented.

INTRODUCTION

Universities have historically developed roles of teaching and research – and in recent years a third role of knowledge transfer has been added. The concept of knowledge transfer can be defined as the process by which research results are transferred to various social participants. These participants form part of the 'systems of innovation'.

In universities, Research Results Transfer Offices (OTRIs) are the interface organisations that form part of the fabric of the university.

They are termed 'interface' because they serve as an axis for the transfer of information. The process of knowledge transfer is an important part of introducing ICT to society.

OTRIs interact with various levels of users and these can be classified as follows:

• Internal users: university community, especially teaching and research staff.

• External users: private and public organisations and especially enterprises.

Starting from the comparative study of the management of research results by public university OTRIs and published in the bachelor thesis, the advantages are presented for the creation of a platform for distributing information about the technologies available from Valencian public universities. Finally, a series of conclusions are given relating to the proposed improvements in the processes of management and diffusion of the results of research and the university's role in transferring knowledge.

BACKGROUND

In recent years, a theoretical framework has been under development for the implementation of electronic administration services based on the principles of interoperability and shared resources.

The information and knowledge society has given the opportunity for public administrations to better exploit the information they hold. The importance of knowledge management has meant that public administrations are giving increasing importance to their intangible assets by using management systems which enable this information to be converted into a knowledge environment on the web.

In Europe, the trend in recent years is to offer integrated services, with interoperability between administrations from local to European level in systems, content, and processes.

These services are the key to creating pan-European services in which the risk of fragmentation caused by the implantation of new systems in the European administration is reduced.

Interoperability in services is not only useful for public organisations, but also improves the relations between public organisations – while citizens and businesses also benefit from the advantages associated with assimilation of the information society. These advantages include: reduced red tape, fewer bureaucratic processes, quicker administrative response times, and an improved economic environment – so encouraging competitiveness and, indirectly, regional economic development.

Recent research on knowledge management emphasises the importance of tools for facilitating the capture, conservation, organisation, processing, and above all, the distribution of knowledge. Knowledge which is currently dispersed can be transformed into manageable 'intellectual capital'. An example of the establishment of communication networks between organizations for facilitating the sharing of knowledge is a proposal included in a World Conference on Science event entitled 'Science for the 21st Century' and organised by UNESCO in Budapest. The resulting Budapest Declaration (1999) made a commitment to create an international centre for scientific communication in London. This centre would coordinate world efforts to ensure that citizens can access scientific communication.

METHODOLOGY USED IN THE ANALYSIS OF THE MANAGEMENT OF RESEARCH RESULTS BY PUBLIC UNIVERSITIES

One of the main elements that public administrations can offer to encourage the information society is online public services – known as e-administration. Online service has been the starting point for the comparative study of OTRIs made in the bachelor thesis. The study took into account aspects such as strategic policy and organizational culture, research activity, and management of the technological portfolio – and focused on the descriptive analysis carried out on two samples of research results management chosen from among OTRIs in Spanish public universities. The first sample consisted of OTRIs in the Valencia region; and the second sample was a selection of OTRIs from other Spanish public universities.

Some of the issues addressed in the *Libro Blanco para la Mejora de los Servicios Públicos* (a Spanish government white paper for improving public services) have been taken into account – for example, the promotion of quality management in public administration.

For public universities in the Valencia region, the management of research results through the Centre for Innovation, Research and Technology Transfer (CTT) at the UPV has been taken as a model. The interface used by the centre for the knowledge system is called CARTA Knext. This system generates a workspace on the web for managing research results and the diffusion of the technological portfolio.

The proposals for improvement have been included inside the strategic plan. Firstly, information flows in OTRIs have been defined in relation to managing research results.

The study of the information systems in OTRIs has enabled the identification of distinct are as of management, participants, and information flows – as shown in the illustration below.

Figure 1. Information flows in OTRIs have been defined in relation to the management of research results. Source: Estrella CORRECHER JULIÁ (bachelor thesis) 2007
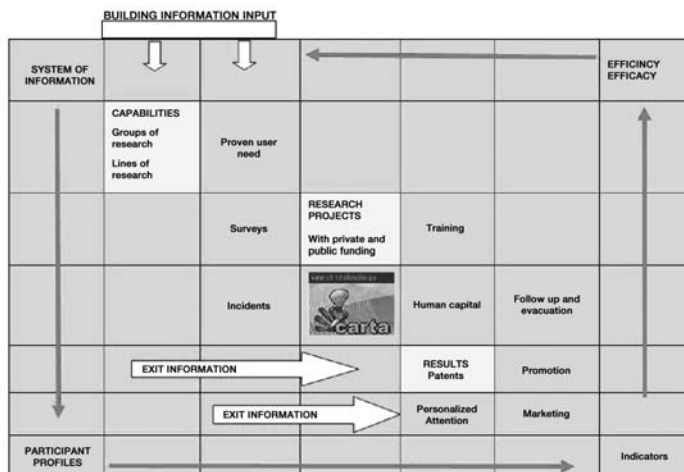
Once the information flows were identified, a strategic map was prepared of how OTRIs are organised in public Valencian universities in relation to the management of research results.

Four levels are shown on the strategic map below (adapted from the Robert Kaplan model): intangible assets; processes; users; and society. Associated objectives are also shown.
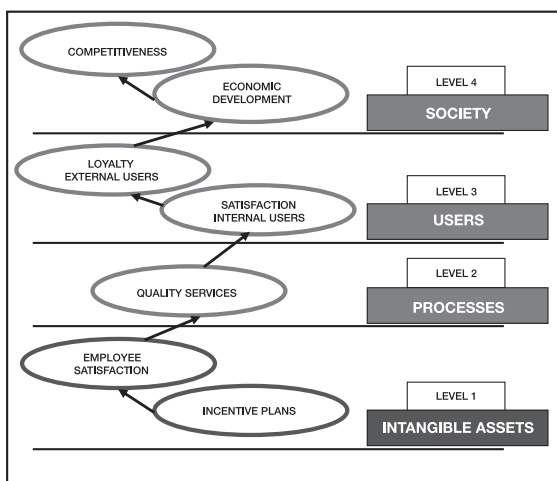
Figure 2. Strategic map of the university OTRIs
Source: Estrella CORRECHER JULIÁ. (bachelor thesis) 2007[3]

NOTES
[3] Adapted from the version given by Daniel MARTI LLUCH. Gestionar el conocimiento en empresas y en la administración pública. 8ª Jornadas españolas de documentación. FESABID 2003

The objectives of the strategic plan with respect to the proposal for improvement are:

- Encourage communication, cooperation, and the interchange of information between OTRIs in public universities in the Valencian region – under the principles of institutional cooperation and interoperability between public administrations.

- Offer globalised information regarding the technological portfolio of Valencian public universities.

- Generate greater transparency regarding the management of research results.

- Create a standard in the process of managing patented research results.

- Transference of the CARTA Knext knowledge management system.

- Transfer knowledge to the various participants in the project: public university OTRIs in the Valencia region, cooperating organisations, the university community, enterprises, and society.

DESCRIPTION OF THE PROPOSED IMPROVEMENT

Three phases have been defined for the implantation of the strategic plan containing the improvement proposal.

Phase 1. Homogenise the management process

This phase consists in adopting a process of homogenised management. This process will be used by the Universidad Politécnica de Valencia in the transfer of research results through the patents system (TRIP) which is the basis of the CARTA Knext tool (knowledge management system).

Phase 2. Distribute and maintain the management of the information

This is the transfer of the system of knowledge management to other OTRIs. In achieving this, OTRIs become more organisationally efficient, and consolidate the functions played by these interface organisations in university structures.

The maintenance of the system of knowledge management is aimed at implementing modules that widen the above mentioned workspace, and enable the proposed introduction of a platform for the distribution of the technological portfolio.

The modules will be the following:

Module for the integration in CARTA Knext of research project management processes.

Currently, management of research projects is not integrated into the CARTA Knext workspace, and so the proposed improvement consists of creating a module in the CARTA Knext workspace for the integration of research projects resulting from the concession of external and internal research grants.

The management of projects includes various stages: preparation of the proposal, grant application, concession, development, justification, and project completion. The

integration of this process in CARTA Knext would enable – via a web platform – the various participants involved in the development of each of these stages to provide information for the knowledge management system. Once the project management has passed through this module, it passes to a later stage in which the research results are assessed, and when necessary, protected with university patents.

It would be useful to obtain a repository of financed projects which have not produced patentable results – but whose results may help identify future lines of research to develop new projects.

Module for integrating CARTA Knext within a system for electronic signatures so that patent applications to the OEPM (Spanish Patent and Trademark Office) can be made using a payment gateway.

The management process in public universities for patent applications for research results is a set of services provided by the OTRIs and includes:

• Processing an application for legal protection of an invention.

• Monitoring of a file opened by the OEPM.

• Monitoring of the extension of a patent to other nations – either through the European Patent Office or the Patent Cooperation Treaty.

• Payment of the corresponding fees for maintenance of patents.

Currently, the CARTA Knext workplace does not enable patent applications to be made on-line to the OEPM, nor does it enable fees to be paid using a telematic payment gateway.

Payments to the OEPM can currently be made online without an electronic signature certificate. The OEPM incorporated the ES-EOLF V2.10 information system in April 2005 through the application of EPOLINE OLF V2.0 from the European Patent Office and the World Intellectual Property Organisation (WIPO). This enabled online application for European patents through the Patent Cooperation Treaty or national patent offices – and means a more efficient and quicker service for users.

The legal framework for the issue of applications for European patents via the Patent Cooperation Treaty was established with Spanish legislative Act 59/2003 of the 19 December which regulated electronic signatures. Applications for Spanish national patents are still pending the approval and publication of the rules that will govern online application procedures. According to the journal of the Patent Cooperation Treaty (number 03/2004 of 15 January), these rules will include the technical parameters necessary for online presentation.

Security for systems for applying for patents online and other online procedures is guaranteed with the advanced electronic signature – using digital Ceres Class 2 certificates with a cryptographic card for each individual signing online applications. This certificate is issued by the FNMT-RCM (Real Casa de la Moneda – Fábrica Nacional de Moneda y Timbre or the Spanish Royal Mint – Spanish National Coin and Stamp Mint) and is compatible with other online identification applications developed for the OEPM, such as:

- Online payments.

- Trademark applications.

- European and Patent Cooperation Treaty applications.

- Appeals.

With this standardised system it is possible to offer a global environment for patent application through a trustworthy platform that enables interoperability between online and application systems.

The implementation of this system in the CARTA Knext workplace includes electronic signature services for submission of online applications to the OEPM. This is achieved by designing a module that includes a link on the workspace from which the online registrations can be completed for national patent applications (where this service is available), as well as international patent applications and extensions through the Patent Cooperation Treaty using the CARTA Knext knowledge management platform. Obtaining a corresponding FNMT digital certificate for the Universidad Politécnica de Valencia is also proposed as part of this improvement.

The architecture for the integration of a standards-based electronic signature and the implementation of web services is shown below:
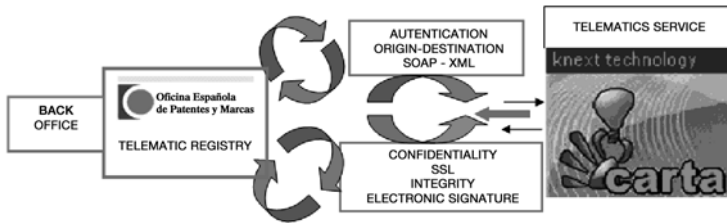
Figure 3. Architecture for integrating electronic signature services into the platform for managing and distributing knowledge.
Source: Estrella CORRECHER JULIÁ, (bachelor thesis) 2007.

As shown in the above diagram, on top of the framework of a front-office providing electronic signature services to the CARTA Knext platform, a back-office must be designed to run on web-distributed architecture. In this way, problems of interoperability are resolved between organizations if this module is implemented in other public Valencian universities. The designed interconnection should meet standards such as: SOAP, XML, WSDL, JAX-RPC, among others.

Processes of authentication based on digital certificates and electronic signatures must be incorporated globally. Security requirements must be met for electronic signature services in the processing of patents and other documents of the OEPM.

The integration scheme for this module in the CARTA Knext knowledge management system is shown below:
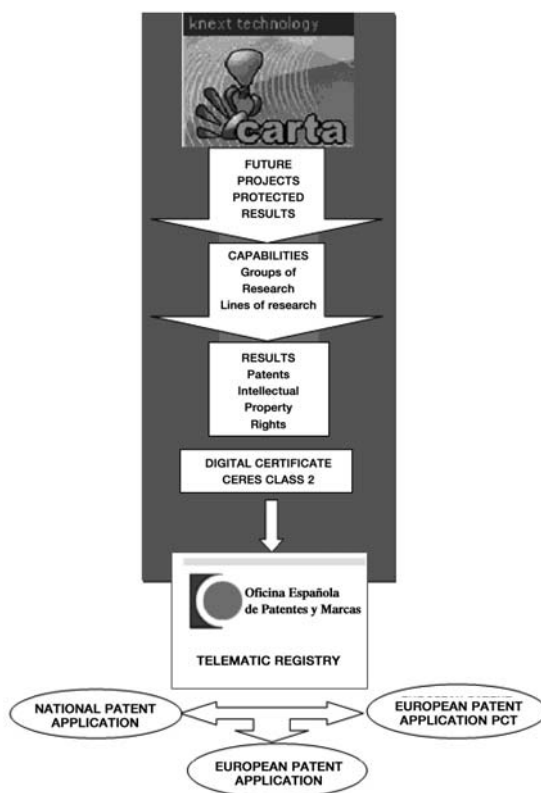
Figure 4. Implementation in CARTA Knext of the Ceres Class 2 digital certificate for online patent applications at the OEPM (Spanish Patent and Trademark Office).
Source: Estrella CORRECHER JULIÁ, (bachelor thesis) 2007

Module for integrating the Searchy meta-search engine in CARTA Knext

The CARTA Knext knowledge management system does not have a meta-search engine. Information from various management areas is handled within the organisation, and the proposal is to share information from public universities in the Valencian region. Therefore, to integrate information from the various organisations, the creation of a module for including a meta-search engine, Searchy, in CARTA Knext is necessary.

This module would enable searches of the technological portfolio of Valencian public universities using web services based on the semantic web. This would facilitate the management of the large amounts of information and data that would be available in knowledge management systems after the implementation of CARTA Knext. Similarly, organizations would also benefit from the internal use of a meta-search engine. The benefits would also be extended to users within the university community, as well as businesses and individuals accessing information regarding public Valencian universities on the web. In this way, knowledge can be managed in a manner appropriate to the needs each layer of users.

Spanish public administrations are making an effort to increase the use of free and open source software – and the Ministerio de Administraciones Públicas (MAP) (the Spanish Ministry of Public Administration) in 2005 issued several recommendations to the Spanish state administration (Administración General del Estado) regarding the use of this type of program.

The rationale for implementing Searchy in the CARTA Knext knowledge management system is that an open source meta-searcher enables consultations to be made from various information systems and integrates the results. The main innovation of this meta-searcher is that the process is achieved in a distributed manner and takes into account an inter-organizational environment. It opens the information available in each organization to other organizations in a fairly simple manner. The exchange of information is achieved through the unified language of the semantic web.

The integration of a Searchy meta-search engine enables information to be structured for levels of user access – and still be viewed by other project users because of the reliability of searches made with the semantic web.

The following is an outline of how to exploit the opportunities offered by Searchy and the opportunity for sharing information between administrations and their various databases.
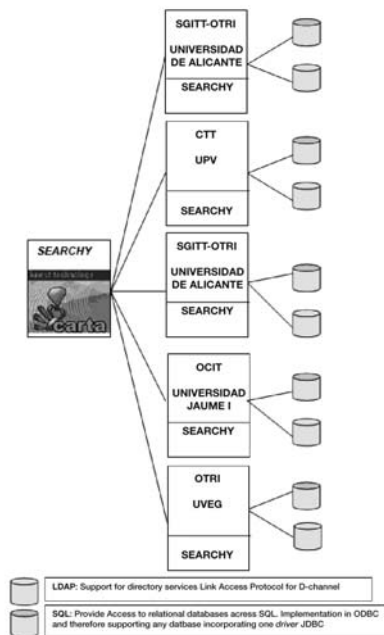
Figure 5. Multiagent design for Searchy implementation of the various information systems managing research results in OTRIs at public universities in the Valencia region. Source: Estrella CORRECHER JULIÁ, (bachelor thesis) 2007[4]

Module for managing enterprise requirements

47

Reports show that significant income can be generated from the transfer of knowledge: the 2005 CyD Report produced by the CyD Foundation indicates that the Spanish university system is an important factor within the Spanish economy. However, despite the economic impact, there is a poor perception by companies of the contribution made by universities to economic development, and 80 per cent of companies have never worked with a university on a research project, nor contracted scientific and technical services. As a result, there is a need for greater transparency in the distribution of university research activity and results.

However, over the past ten years both universities and administrations have made a great effort in developing policies of transfer, entrepreneurship based on technology, or participation in scientific and technological clusters, as well as other examples.

Some of the factors that make technology transfer inefficient include:

• Lack of awareness of technological portfolios.

• An imbalance between technological supply and demand.

The recent reform of legislation regulating Spanish universities (LOU) stated that 'Universities must foster cooperation with the productive sector, as stipulated in Article 83. To this end, they must encourage staff to participate in the creation of centres or mixed structures which actively participate in knowledge networks and technology platforms'. This requirement reinforces the need for the implementation of the proposed improvements to the current system.

Once integrated into Valencian public universities, the CARTA Knext knowledge management platform would enable improvements in satisfying the demands of users – and especially enterprises.

The implementation of the module for managing demand from companies would provide a strategic approach to the diffusion and marketing of the technological portfolio of universities. Companies mainly from the Valencia region would have access to web services showing the portfolios of universities and public research bodies – without the need for multiple searches in various organizations.

The implantation of this module would offer benefits for the use and marketing of university patents at a regional level.

This module would be open to enterprises but their access would be limited to just certain areas of public information contained in CARTA Knext, such as:

• Information on technological portfolio.

• Research groups (non-confidential information).

• Research lines (non-confidential information).

NOTES
[4] Prepared from the data contained in: Integrando la información de las Administraciones Públicas en la gestión del conocimiento. Una solución desde la Web semántica y los servicios Web BARRERO, David y CRIADO, J. Ignacio. VIII Jornadas TECNIMAP 2004. Murcia, 28 September to 1 Octubre 2004

The platform should enable enterprises to register and obtain a user code. This would be achieved by implementing the XML Key Management Protocol platform for web services, and distributing public keys. To obtain a public key, firms must complete a web form with basic data.

Phase 3. Institutionalization of the management of knowledge.

The creation of the technological platform COVATRI (Valencia Region Research Results Transfer), based on CARTA Knext, would take place during this phase – together with the integration of the modules proposed above and the participation of the public Valencian universities as implementers and the regional administration as financial backers of the project.

An outline of the completed design of the COVATRI technological platform is shown below.
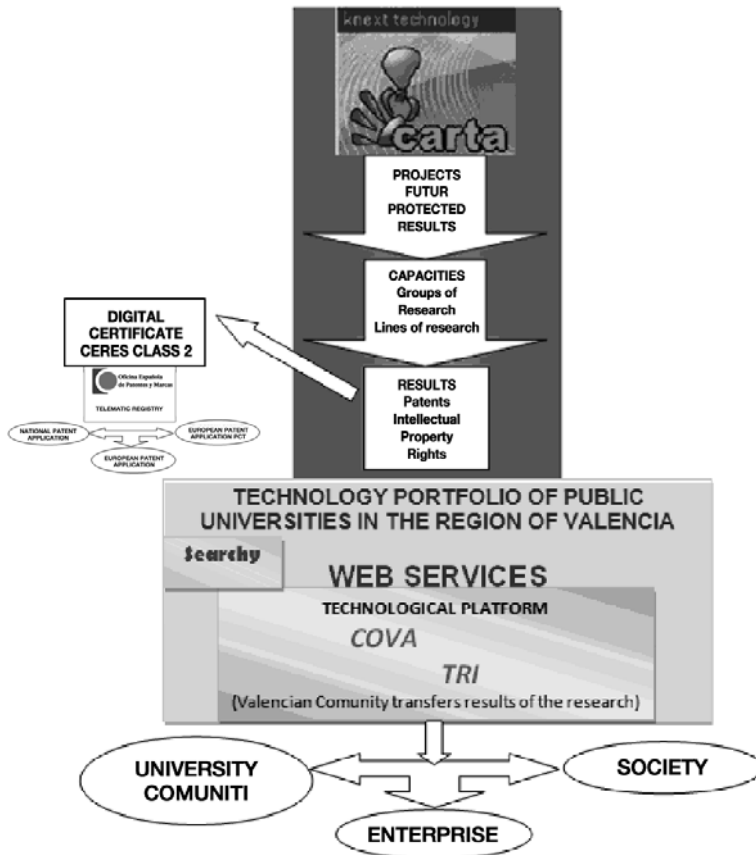
Figure 6. Design of the COVATRI (Valencia Region Research Results Transfer) technological platform. Source: Estrella CORRECHER JULIÁ, (bachelor thesis) 2007.

ADVANTAGES OF IMPLEMENTING THE TECHNOLOGICAL PLATFORM (COVATRI).

The advantages of distributing the CARTA Knext knowledge management system among public universities and integrating the technological portfolio of public universities into COVATRI are summarized below:

Functional advantages for OTRIs

• Simplification of user interaction with OTRIs by using adequate channels.

• Generation of new services that mean greater added value for OTRIs.

• Personalized treatment for users, agencies, businesses, or university staff.

• Use of an interface tool for achieving objectives related to technology transfer, and featuring:

    • Single point of web access for enterprises.

    • More rational management of the technological portfolio so facilitating diffusion in the region of Valencia and beyond.

Advantages for research results management

A single platform will combine the following processes:

• Research project management.

• Research results management using the TRIP patent process.

• Management of research results protection.

• Marketing and diffusion of the technological portfolio.

Advantages with respect to information management for participating organisations involved in the improvement

Through a workspace based on a network shared by several organizations, the public university OTRIs in the region of Valencia will enjoy the following advantages with respect to knowledge management:

• Greater access to information from each of the linked organizations.

• Avoidance of information inconsistencies.

• Reduction in work time.

• Recuperation of information with minimum noise.

• Online access to information.

• Greater fluidity of communications within each organisation – and between staff at OTRIs, research teams, and enterprises.

CONCLUSIONS

The proposed introduction of the COVATRI technology platform is based on the following concepts:

- The value represented by the spread of the CARTA Knext knowledge management tool, and the implementation of its various modules, is centred on the modernization of the involved organizations by incorporating a variety of services based on a single chart of telematic services.

- Globally distributing the technological portfolio through web services would provide an interface between universities and society, and improve the flow of knowledge and technology transfer.

- The needed support from the involved institutions, both in the performance and in the financing of these proposals, would provide an example of inter-administrative cooperation and help promote an innovative culture.

- Implementation of proposed improvements will transform the COVATRI technology platform into a channel which will facilitate the renewal of the industrial base, encourage competitiveness, and economic development at regional level.

ACKNOWLEDGEMENTS

BIBLIOGRAPHY

[1] AGUIRRE, S., SALVACHÚA, J., QUEMADA, A., MOZO, A. (2005) "Uso del Web semántico para la interoperabilidad Semántica de recursos educativos en Internet y redes P2P"

[2] BARRERO, David, CRIADO, J. Ignacio. (2004) "Integrando la Gestión del Conocimiento en las Administraciones Públicas. Una Solución desde la Web Semántica y los Servicios Web" en VIII Jornadas sobre Tecnologías de la Información para la Modernización de las Administraciones Públicas: TECNIMAP 2004, Murcia.

[3] BITRIÁN, Mariano (2005)." Presentación telemática de patentes". OEMP. Universidad Carlos III. Madrid, 17 de marzo de 2005.

[4] BOLETIN EUROBOX. (2004) "La patente comunitaria: un tercer nivel de protección" IRC CENEO. Eurobox n° 75 julio-agosto 2004.

[5] CTT-UPV. MATEU, Amparo. (2006) "Curso de gestión de I+D y transferencia de conocimiento en las universidades".

[6] LABIANO, Javier. (2005) "Aplicaciones de firma electrónica en las AA.PP" en Sociedad de la Información"

[7] MARTIN, Tomás. (2005) "De la e-Administración al liderazgo en la prestación de servicios públicos" en ASTIC. Boletic n° 35 septiembre. Monografías: Con paso seguro.

[8] MARTINEZ USERO, José Angel y PALACIOS RAMOS, Elsa. (2003) "XML: un medio para fomentar la interoperabilidad, explotación y difusión de contenidos en la administración electrónica. Contenidos y Aspectos Legales en la Sociedad de la Información" en Congreso CALSI, 24 Valencia, octubre.

[9] MINISTERIO DE ADMINISTRACIONES PÚBLICAS. (2005) "Propuesta de recomendaciones a la Administración General del Estado sobre utilización del software libre y de de fuentes abiertas".

[10] PROPUESTA DE DECISIÓN DEL PARLAMENTO EUROPEO Y DEL CONSEJO (2003) "La prestación interoperable de servicios paneuropeos de administración electrónica al sector público, las empresas y los ciudadanos"

[11] RUBIO, F; DUART, J. M., y LUPIÁÑEZ, F. (2005) "Estrategias de introducción y uso de las TIC en el sistema universitario español. 2005" en revista de Universidad y Sociedad del Conocimiento Vol.2, n° 1

[12] TOMÁS FOLCH, Marina. (2003) "Gestión del cambio en la Universidad" en revista Acción pedagógica Vol. 12 n° 2 UAB.

[13] TORRES OLIVARES, M. (2002) "Edición personal. Fideliting"

[14] ZORRILLA, Juan Pablo. (2006) "La información como estrategia en un contexto global y competitivo: una revisión teórica" en revista Intangible Capital n° 12 -Abril-Junio.

A Cross-Application Reference Model to Support Interoperability

Elena Baralis
Politecnico di Torino
Torino, Italy
elena.baralis@polito.it

Tania Cerquitelli
Politecnico di Torino
Torino, Italy
tania.cerquitelli@polito.it

Silvana Raffa
CSI Piemonte
Torino, Italy
Sivana.Raffa@csi.it

ABSTRACT

Data and service requests are currently generated and managed in a distributed fashion. Furthermore, different actors (e.g., service providers, product sellers, governmental organizations) need to exchange data in a wealth of different formats.

To allow an effective information exchange, systems need to support interoperability, thus enabling the sharing of information and knowledge. To this end, a general-purpose exchange data model needs to be defined.

While many efforts have been devoted to the design of ad-hoc exchange data models, less attention has been devoted to the design of a general reference model. This reference model should define a set of unifying concepts and relationships, which are independent of the specific application domain.

This paper proposes a cross-application reference model (i.e., a meta model) which provides a high level definition of concepts and relationships, in terms of data and metadata (e.g., data provider description, data beneficiary/user identification, data quality dimensions). This reference model provides a general infrastructure for the definition of customized data sharing services in a given application domain.

The proposed cross-application reference model has been exploited to build different data models for data exchange in real systems (e.g., the heterogeneous context of the Piedmont registry office of welfare beneficiaries).

The performed validation shows the adaptability and effectiveness of the proposed reference model.

53

INTRODUCTION

Data and service requests are currently generated and managed in a distributed fashion. Furthermore, different actors (e.g., service providers, product sellers, governmental organizations) need to exchange data in a wealth of different formats. To allow an effective information exchange, systems need to support interoperability, i.e., ability of different systems and organizations to work together (i.e., interoperate) for exchanging data and for sharing information and knowledge [8]. Interoperability can be treated at different levels such as technical, semantic/conceptual, and organizational [4]. Achieving technical interoperability means providing efficient solutions to solve technical issues arising from linking different computer systems and services. However, syntactical and structural heterogeneity issues could cause misunderstanding of data. Semantic interoperability techniques can solve these problems by ensuring that the meaning of exchanged information is understandable by any application. Data enriched with semantics enable meaningful processing. Furthermore, by defining business processes and improving the collaboration of administrations wishing to exchange information, organizational interoperability can be achieved. We focus on semantic/conceptual interoperability. To this end, a framework for data sharing and reuse beyond the community boundaries, across enterprises, and among applications is required. In this context a winning feature is the definition of a general exchange data model to support interoperability that can be rapidly customized with reusable domain specific meta-data and ontologies. Consider, for example, different organizations that need to share data and services in a wealth of different formats. Each data provider and each user application exploits its own local data schema. However, when they need to share information and knowledge, a sharing platform is required. The sharing platform can be an integration bus (i.e., infrastructure) in which data providers render their services and data users access useful information and knowledge. The first step in the infrastructure design is the definition of data exchange models. Application domains may require different data exchange models. However, a general reference model could be rapidly customized with domain specific metadata and ontologies.

On March 1, 1977, the Piedmont regional administration, together with the University and the Politecnico di Torino decided to set up the "Consorzio per il Sistema Informativo del Piemonte" (i.e., CSI Piemonte) – a consortium for the regional information system – with the aim to innovate local government through information technology. Over these thirty years, CSI Piemonte has devoted a significant effort to the development of a regional system offering effective services to citizens and businesses to promote the area's development. In this context, the interoperability of regional public authorities becomes a key issue. CSI Piemonte has developed the Piedmont Regional Information System to allow different public bodies to cooperate. In the last ten years, the need to exchange and share information and services among different Public Authorities has been steadily growing. CSI Piemonte is addressing this issue by means of several different projects to allow technical and semantic interoperability. Interoperability may be achieved at growing levels of complexity: (a) interoperability among public subjects of the Piedmont Public Authority (e.g., Piedmont registry office of welfare beneficiaries project), (b) interoperability among Italian regions (e.g, the ICAR interoperability project), and (c) interoperability between Piedmont and Italian Public Authority (e.g., the SPCoop project). Since all projects are characterized by a common domain model (i.e., interoperability support for public sector information systems), a reference model may allow sharing relevant semantic concepts in the public sector applications and may effectively support CSI developers.

The challenge of this work is to design a reference model to simplify the modeling task and to allow inter-operability among different public systems and public organizations. Thus, this paper presents a cross-application reference model which provides guide lines for the modeling process and model templates in the public sector context. The proposed reference model, also called canonical information model, describes data from the business point of view and introduces a set of metadata (e.g., data provider description, data beneficiary, user identification, data quality dimensions) to enrich information. It is independent of the logical and physical schema exploited by data providers and data consumers. Furthermore, it is easily customizable to support data sharing services in a given application domain. Thus, the model helps domain experts during the design of customized data sharing services. The proposed cross-application reference model has been exploited to build different data models for actual data exchange in real systems (e.g., the heterogeneous context of the Piedmont registry office of welfare beneficiaries, Piedmont Regional Information System). The performed validation shows the adaptability and effectiveness of the proposed reference model.

The paper is organized as follows. Section 2 describes the main features of the cross-application reference model designed to support interoperability. In Section 3 real information systems to validate the proposed approach are presented. Section 4 describes the INTEROP tool and its main features. Section 5 discusses related work, while Section 6 draws conclusions and presents future developments of the proposed approach.

A CROSS-APPLICATION REFERENCE MODEL

The cross application reference model (i.e., canonical information model) identifies a set of concepts useful to model data, services and metadata (e.g., actors and data quality dimensions) to support interoperability. Each concept consists of micro-concepts including different attributes. Due to lack of space, this papers presents the micro-concepts, whereas a complete description of the attributes devised to model concepts is available in [5]. Four concepts have been introduced and detailed in the following. The complete reference model is shown in Figure 1 and Figure 2.

Person, identified by a unique code, can be a natural person or a legal person. In the reference model, this classification is modeled by means of a total and exclusive generalization (see Figure 1). A legal person is any legal entity duly constituted under applicable law, for profit, privately-owned, or governmentally-owned. It also includes any corporation, trust, partnership, joint venture, or association [3]. Different micro-concepts have been devised to characterize a legal person: Tax registry identification, company name, incorporation information, company size, and cutback information. For each micro-concept a set of attributes have been devised (see [5] for further information). To characterize a natural person, different micro-concepts have been identified, such as registry identification (i.e., name, surname, date of birth, city of birth, sex), tax registry identification, citizenship, civil status, passport number, social security number, and local health unit of enrollment. For each natural person, the proposed approach is able to model any residence changes by means of a ternary relationship among location, natural person, and time entities. The identifier of the time entity is the start date (i.e., date in which the residence in a given location started). The many-to-many relationship is also characterized by an attribute (i.e., the end date) which models the date in which the residence of a given person in a given location ends. Other ternary relationships model

any domicile changes of natural persons. Furthermore, a legal person can be classified as a public legal person, which pursues public interests, or a private legal person, whose aims are privately-owned. This classification has been represented by means of a total and exclusive generalization (see Figure 1). For each legal person all organizational units are known. This aspect is modeled by means of a one-to-many relationship defined between the legal person and the organizational unit entities. Since an organizational unit can be a (distinct) legal person, a one-to-one relationship (called can be) is also defined between organizational unit and legal person entities. For example, consortia are legal persons whose members (also called organizational units) are other legal persons. A person can play the role of service provider or service consumer. The proposed approach can model the role of the person for different periods of time (i.e., start/end dates). Identifiers of provider entities and consumer entities are automatically assigned by the system (see Figure 2). Since a person carries out different professions, and some of them require to be written in a given register (e.g., medical register, the Rolls), the proposed reference model is able to represent these aspects. Furthermore, the same person can perform different professions at the same time. Thus, the profession entity is characterized by an external identifier (i.e., subject identifier), starting date and profession identification.

Since only a subset of professions requires the register enrollment, the participation to the binary relationship written in, defined between profession and register entities, is optional. The complete list of skills required to perform any profession is included in the model definition. Finally, the public legal person managing each register is known (see Figure 1). Goods can be classified as personal properties and real estates by considering the tax office view. This classification is modeled by means of a total and exclusive generalization. The location is known only for real estates. Since a given real estate has only one location and in each location there is only one real estate, a one-to-one binary relationship has been defined between real estates and location entities. The list of owners and possessors of each good in each period of time (i.e., start/end dates) is also modeled. Different goods classification can be modeled by means of the proposed meta-model discusses in Section Upgrade of the cross-reference model.
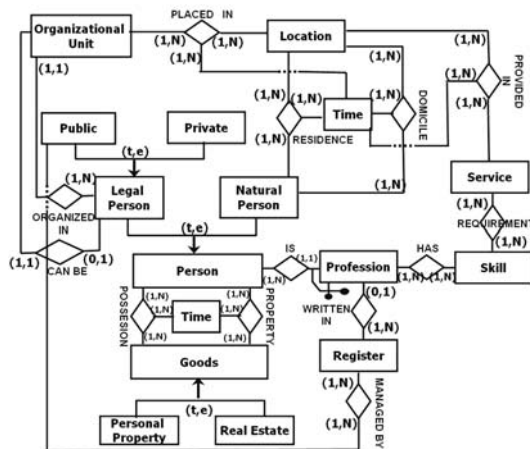
Figure 1. The proposed reference model – Part I
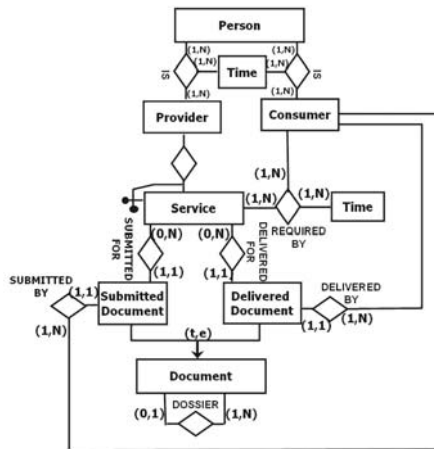
Figure 2. The proposed reference model – Part II

Service is an activity by means of which data are shared or exchanged. However, in this work the service entity models a broader concept. For example different services are modeled by means of the service entity (e.g., services of physicians, services of business consults, services of civil engineers). The same service can be provided by different providers at the same time. To uniquely identify each service, an external identifier (i.e., provider identifier), the starting date and the service identifier are exploited. Furthermore, since the same service can be provided in different locations and in different times, a many-to-many ternary relationship is defined between service, location, and time entities. The binary relationship between services and skill entities models the list of skills required to provide a given service.

Document can contain different information and is classified as delivered or submitted. To model this classification, a total and exclusive generalization is exploited (see Figure 2). For delivered documents, the service for which they are delivered and the user who has delivered them are known. These aspects have been modeled by means of one-to-many relationships among delivered documents and user entities, and delivered documents and service entities. Instead, for submitted documents, the service for which they have been submitted and the user who has submitted them are modeled by means of two one-to-many relationships among the corresponding entities. Finally, for any document the dossier in which it is included is modeled by means of a recursive relationship defined on the document entities.

Upgrade of the cross-reference model. When the cross-application reference model is exploited to design a customized data sharing service in a given application domain, only the interesting concepts, micro-concepts and attributes are materialized. According to the application domain in which the reference model is exploited, different aspects of the same concept need to be modeled. Some attributes, some micro-concepts, or some generalizations may be undefined in the proposed reference model. Consider, for example, a local health unit which provides services to welfare beneficiaries. Different person types can interoperate (e.g., physician, welfare beneficiaries, local health unit employees). In this case at least four person types need to be modeled and each one is characterized by a set of different attributes. To address these issues, an embedded meta-

model, exploited to upgrade our reference model, is proposed. The meta-model, as shown in Figure 3, is represented by means of a ER-schema. Thus, the ER-schema contains metadata extending the original reference model shown in Figure 1 and Figure 2. For each basic concept (i.e., person, service, good, document) the type is specified, modeling the interesting classification of the corresponding concept. For example, the local health unit may be interested in the following person types: Physicians, welfare beneficiaries, and local health unit employees. Each person type is characterized by a set of attributes with a many-to-many relationship between person attributes and person type entities, as shown in Figure 3. For each attribute, the corresponding data type exploited to represent it can also be modeled. The proposed upgrade strategy allows extending any entity defined in the original reference model (see Figure 1 and Figure 2).

By means of a set of transformation rules this metadata can be transformed in a new portion of the reference model. For example, records of the person type entity can define either a new generalization of the person entity or a set of new entities, one for each record. Each new entity is characterized by a set of attributes defined by means of the person attribute entity and the many-to-many relationship called characterized by. The data type of each attribute is defined by means of the type relationship shown in Figure 3. This rule can be exploited for any concept defined in the reference model. Furthermore, the cross-application reference model can be upgraded by means of a new relationship among concepts. To address this issue, new metadata are included. The metadata are represented by means of a new entity called Concept with a recursive many-to-many relationship. The relationship is characterized by an attribute called cardinality which defines the relationship cardinality. By means of this template, new relationships among entities can be easily added to the reference model.
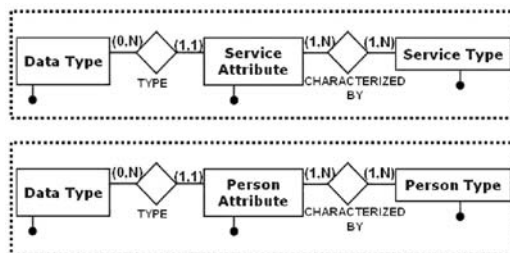
(a) Meta-models of the Person and Service concepts
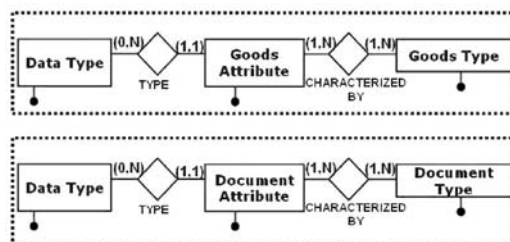
(a) Meta-models of the Document and Goods concepts

Figure 3. Upgrade of the cross-reference model

58

DATA QUALITY DIMENSIONS

To support interoperability, data need to be characterized by a high quality. Poor data quality causes management issues in terms of both cost and efficiency for data consumers and providers.

To efficiently support interoperability we need high quality data, which are intrinsically good, contextually appropriate for the task, clearly represented, and accessible to the data consumers and users. Intrinsic data quality denotes that data have quality in their own right. Some indices have been defined to evaluate such aspect (e.g., accuracy, believability, reputation).

Contextual data quality highlights the requirement that data quality must be considered within the context of the task at hand. Useful indices to evaluate contextual data quality are the completeness, the timeless, the value-added, the relevance, and the appropriate amount of data.

The importance of the role of systems is emphasized by representational data quality (e.g., consistency in terms of representational consistency, internal consistency and external consistency) and accessibility data quality (e.g., accessibility, access security).

To enrich the reference model shown in Figure 1 and Figure 2, different data quality attributes can be included. Figure 4 shows the ER-schema exploited to model data quality dimensions and its values computed on a single attribute value, a single record of a given table (i.e., entity), or on a given table. In Figure 4, a generic entity called ENTITY is reported.

This schema can be exploited for any entity defined in the reference model. According to the application domain, a subset of entities are selected to assess data quality indices.
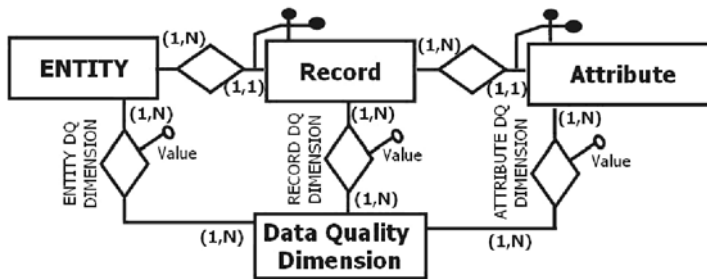
Figure 4. The proposed reference model – Part I

REAL SYSTEMS

The proposed cross-application reference model has been exploited to build (i) a data model for actual data exchange in real systems, and (ii) a data model for a specific application. Details of the validation are described in the following.

AURA project

The AURA project, which is currently under development in CSI Piemonte, aims at providing a unique and centralized database for the regional registry office of welfare beneficiaries. Personal data and health information (e.g., SSN, payment exemptions, health service physician of choice) need to be shared to provide a unique view of such information. Different actors provide and access data to and from the AURA database. Actors can be classified into legal persons (e.g., local health units, regional health units, Ministry of Finance, etc.) and natural persons (e.g., welfare beneficiaries, physicians, public employees). Since a subset of natural persons (e.g., physicians) carry out professions which require to be publicly registered (e.g., into the medical register), the AURA data model contains the list of registered natural persons. To model such requirements, the *subject* entity with its own generalization, the *profession entity*, the *registry* entity and the corresponding relationships are materialized. To model other natural persons, the upgrade strategy presented above is exploited. A new *generalization on natural person* entity (i.e., welfare beneficiaries, physicians, public employees) is designed. It is characterized by three child entities and each child has a proper list of attributes.

The same subjects can be data/service providers or data/service customers or both at the same time or in different times. Different service data need to be stored (e.g., payment exemptions, health service physician of choice). For each service, a list of documents can be submitted by users (e.g., exam requests) or delivered to users (e.g., diagnoses). Thus, the data model needs to store any type of document for any service along with document provider and consumer. To model these requirement, *provider, customer, service*, and *document* entities, with the corresponding relationships, are materialized.

To address the data quality issue, a set of data quality dimensions, modeled as discussed above have been included in the AURA data model. They guarantee that data are intrinsically good, contextually appropriate for the task, clearly represented and easily accessible to data consumers. The detailed and complete AURA data model schema is reported in [5]. We can observe that the design of the AURA data model has been easily performed by means of the proposed reference model.

Piedmont Regional Information System

The Piedmont Regional Information System, developed by CSI Piemonte, is characterized by a centralized database in which many different types of data are stored. A small portion of this database, called *Test P-DB*, stores a staff registry, a consulting registry, the regional organization structure, and roles of regional workers. To validate the adaptability of the cross-application reference model, the design of the customized *Test P-DB* data model has been simulated.

The regional organization structure is characterized by subjects that can be either a natural person or a legal person. A legal person can be either public (e.g., a local authority) or private (e.g., a company). Public legal persons are organized in a set organizational units. An organizational unit is usually located in different branches at different times. All these concepts are presented in the proposed reference model (see Figure 1), hence they are directly materialized. A natural person has a relationship with another subject by means of a relational role, which is characterized by a relationship duration.

Each natural person can have more than one role in a lifetime. This requirement is modeled by means of an instance of the *Concept* template which is transformed in a many-to-many relationship between the natural person and the subject entities.

An organization can be higher in hierarchy with respect to another organization unit, it can have a commission in another organization unit, or it can be originated by another organization units, as its evolution. To model these issues, four different instances of the reference model *Concept* template are exploited. These instances are transformed into four recursive relationships on the organization unit entity.

Regional workers (who are a subset of natural persons) can be classified into consultants and employees. Position and primary assignment are known for each employee, whereas the role and the contract duration are known for each consultant. By means of the upgrade strategy of the cross-application reference model, a new generalization is defined on the natural person entity. Furthermore, a consultant has a relationship with a private legal person, whereas an employee has a relationship with a public legal person. This issue is modeled by means of two binary (one-to-many) relationships. The first is between consultant and private legal person entities, while the second is between employee and public legal person. The detailed and complete *Test P-DB* data model schema, generated by means of the cross-application reference model, is reported in [5]. This data model presents the same features of the real system. Hence, our proposed approach is easily customized to derive a data model for a specific application.

THE INTEROP TOOL

To efficiently exploit the proposed canonical information model, the INTEROP tool has been designed. Given the XML schema of the cross-application reference model and the specific domain ontology, represented in OWL language [9], the INTEROP tool (see Figure 5) automatically designs the exchange data model for a customized data sharing service. Furthermore, a set of hints (e.g., new domain concepts, new domain relationships) can be provided by domain experts to the INTEROP tool. Since an ontology provides a classification of concepts within a domain and their relationships [6], it is exploited to tailor our reference model to the specific application. The more detailed the ontology is, the more customized the exchange data model will be. Ontology concepts are mapped in the cross-application reference model by means of a set of transformation rules.

Transformation rules (i.e., a set of dependencies between application domain concepts and reference model templates) provide a powerful mechanism to deal with automatic design of complex customized data model. Dependencies, instantiated into a set of operative rules, can be classified into two classes: (i) *Ontology versus data model* and (ii) *metadata transformation*.

The first set of dependencies define the mapping between concepts and relationships of the domain ontology and the data model templates. The second set of operative rules define how to perform the upgrade strategy of the cross-reference model (e.g., metadata, shown in (see Figure 3), are transformed in data model templates). Sometimes the specific domain ontology is not available. However, the proposed reference model simplifies the modeling task by providing guide lines for the modeling process and the modeling templates.
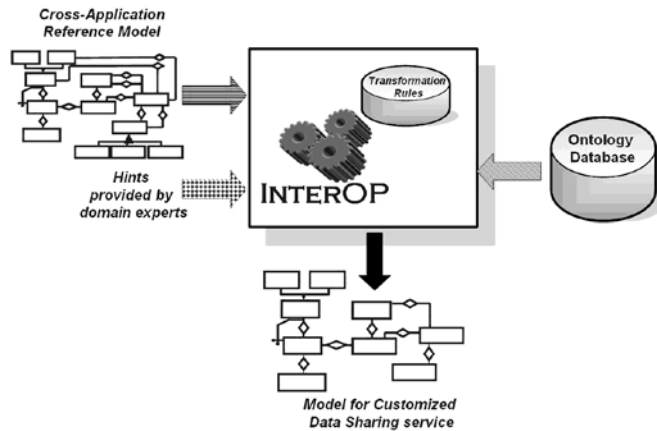
Figure 5. INTEROP architecture

RELATED WORK

Information modeling has proved to be useful in supporting data and process design [7]. By means of a reference model [10], information system research can import basic theoretical knowledge into real applications. A reference model consists of a minimal set of unifying concepts, axioms, and relationship within a particular domain, and it is independent of specific standards, technologies, and implementations [10][11]. [2] defines the reference model term as the abstract definition of how to describe and develop a domain of interest by means of: (i) Building blocks (usually abstract concepts) used to build models in the particular domain, (ii) relationships among these building blocks, (iii) a recipe for building specific models.

While many efforts have been devoted to (i) design enterprise specific models, referred to a concrete enterprise context, or (ii) define reference models for the specific domain of interest [11], less attention has been paid to the design of a general reference model independent of the application domain. Two different approaches have been exploited to design general purpose reference models. The first focuses on specifying the process of model development, while the second provides templates for specific models. Since reference models should provide appropriate generalizations of existing domains and aims at delivering blueprints for good system design, they are both descriptive and prescriptive.

Proposes a life event reference model at different abstraction levels. It provides templates able to model any life-event model. The reference model can be specialized to design a model of a specific life event in a specific country (e.g. getting married) or tailored to a set of specific user needs (e.g., applying for marriage, obtaining an identity card, obtaining a birth certificate). The approach presented in this paper is similar but more general, since it focuses on the design of a general reference model to support an effective information exchange (i.e., to allow two different organizations to interoperate). Our reference model provides a high-level definition of concepts and relationships, in terms of data and metadata (e.g., data provider description, data beneficiary/user identification, data quality dimensions).

Furthermore, many real systems are designed according to the model driven architecture (called MDA) approach [1]. MDA [1] defines an approach to IT system specification to separate the system functionality (e.g., business aspects) from the technological aspects (e.g., technological details of system functionalities). MDA models can be classified in three vertical layers: (i) Computation-Independent Models (CMI) which provide a domain model. A CIM does not show details of the system structure and uses a vocabulary that is familiar to the practitioners of the domain. (ii) Platform-independent Models (PIM) which do not contain any technology-specific information, and (iii) Platform-Specific Models (PSM) that include information about the specific technologies and platforms exploited in the model development. The last two layers present different levels of abstraction. The first is more general, whereas the second is specific, since it is derived from the PIM using a transformation mechanism. Hence, PSMs possibly contain elements that are specific to the platform. The proposed cross-application reference model can be profitably exploited to build the CMI level of any MDA system. Furthermore, without showing details of the system structure, it defines a set of unifying concepts and relationships which are independent of the specific application domain. The proposed model can be exploited for the definition of customized data sharing services in any given application domain.

CONCLUSIONS AND FUTURE WORK

In this paper a canonical information model has been proposed. It provides model templates and guide lines for the modeling process. A set of general concepts, useful to model data, services, and metadata (i.e., actors, data quality dimensions) to support interoperability, have been identified and characterized. The proposed reference model can be exploited by any domain expert to design data sharing services in public sector domain. To validate the adaptability and effectiveness of the proposed approach, we exploited the reference model to build a data model for actual data exchange in a real system and a data model for a specific application.

We are currently defining a set of operative rules to automatically map domain concepts into the reference model templates. Furthermore, we are currently implementing a Java prototype of the INTEROP tool framework to automatically design and customize data sharing services. Since the IBM Center for Advanced Studies of Rome within the project SPCoop (Semantic Integration of Italian eGovernment Services) are currently developing a database ontology for eGovernment services, we plan to exploit it to extend the validation of the presented reference model.

REFERENCES

[1] OMG Model Driven Architecture [Online]. Available: http://www.omg.org/mda/.

[2] SmartGov Project: A Governmental Knowledge-based Platform for Public Sector Online Services [Online]. Available: http://www.smartgov-project.org/.

[3] Manual on Statistics of International Trade in Services. Eurostat, IMF, OECD, UN, UNCTAD, WTO. Annex II, Glossary, 2002.

[4] European Interoperability Framework for pan-European eGovernment Services. Luxembourg, European Communities 2004.

[5] T. Cerquitelli. Technical Report. [Online]. Available: http://tasmania.polito.it/twiki /bin/view/Public/TaniaCeruitelli/ERmode

[6] C. Curino, E. Quintarelli, and L. Tanca. Ontology-based information tailoring. In 22nd International Conference on Data Engineering Workshop. IEEE Computer Society, 2006.

[7] Fowler M. Analysis Patterns: Reusable Object Models. Addison-Wesley, 2001.

[8] ISO. ISO/IEC 2382-01 Information Technology Vocabulary, Fundamental Terms. 2003.

[9] D. L. McGuinness and F. V. Harmelen. OWL Web Ontology Language Overview, W3C Recommendation. [Online]. Available: http://www.w3.org/TR/owl-features/.

[10] O. Thomas. Understanding the term reference model in information systems research: History, literature analysis and explanation. In Book Business Process Management Workshops, volume 3812 of Book Series Lecture Notes in Computer Science, pages 484–496. Springer, 2006.

[11] O. Thomas and A. Scheer. Tool support for the collaborative design of reference models. a business engineering perspective. System Sciences, 2006. HICSS '06. Proceedings of the 39th Annual Hawaii International Conference on, 1, 04-07 Jan. 2006.

[12] L. Todorovski, M. Kunstelj, and M. Vintar. Reference models for e-services integration based on life-events. In M. Wimmer, H. J. Scholl, and A. Gronlund, editors, EGOV, volume 4656 of Lecture Notes in Computer Science, pages 92–103. Springer, 2007.

[13] G. Vetere. Semantic Integration of Italian eGovernment Services. [Online]. Available: http://www.dis.uniroma1.it/lenzin/INFINT2007/material/Vetere.pdf.

[14] R. W. Wang and D. M. Strong. Beyond accuracy: What data quality means to data consumers. In Journal of Management Information Systems, volume 12, pages 5–30. Springer, 1996.

Applying Soa to Mobile Secure eGovernment Services. The Sweb Approach

Silke Cuno, Yuri Glickman, Petra Hoepner, Linda Strick
Fraunhofer FOKUS,
Berlin, Germany
Silke.Cuno|Petra.Hoepner|Yuri.Glickman|Linda.Strick@fokus.fraunhofer.de

ABSTRACT

SWEB is an EU international cooperation project that aims to develop a secure, interoperable, open and affordable government platform upon which secure cross-border mobile government services can be built. To ensure interoperability the SWEB platform is designed according to SOA concepts and implemented with Web services.

INTRODUCTION

Among the many promises of the digital revolution is its potential to strengthen democracy and make governments more responsive to the needs of their citizens.

EGovernment is defined by the World Bank Group]: "E Government refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government.

These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions." One of the main challenges with a great potential is the following goal:

"E-Government can help to build trust between governments and citizens".

To build trust, securing the eGovernment systems, services and service users is a necessary task.

Governments around the world work on the integration of the existing systems to provide them as eGovernment solutions. Most of these solutions have been started as functional approach that led to silo applications and generated islands of eGovernment solutions.

Sooner or later these islands will be forced to interoperate on local, state, national or even pan-continental level. Interoperability will therefore be the main challenge to enable "cooperative government" for efficient information exchange over heterogeneous technology and organizational domain boundaries.

Interoperability is defined in the European Interoperability Framework (EIF): "Interoperability means the ability of information and communication technology (ICT) systems and of the business processes they support to exchange data and to enable the sharing of information and knowledge. An interoperability framework can be defined as a set of standards and guidelines that describes the way in which organizations have agreed, or should agree, to interact with each other."

The second version of the European Interoperability Framework (EIF2.0) is expected in 2008 and will take into account the national interoperability frameworks and related activities that today either already exist in the Member States or are being prepared.

In a Gartner report for the European Commission the main issues and barriers to interoperability were identified, as well as pan-European public services that need to be resolved in the near future by the EU Member States and industries. However, to enable cross-border public services usage, national governments shall provide their applications as basic public services and therefore need to reflect all legal, organizational, process, semantic and technical measures necessary to do so. The figure below depicts the Generic Public Services Framework.
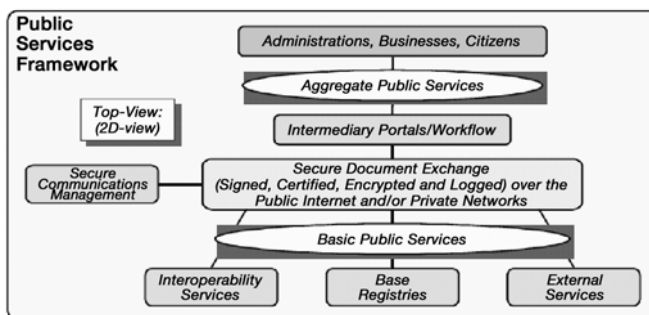
Figure 1: The Generic Public Services Framework (Source: Gartner Report [6])

To support these goals EU Member States have to define an eGovernment architecture and infrastructure, which facilitates the integration and use of new and existing applications in a service-oriented way.

SOA AND WEB SERVICES

The World Wide Web Consortium (W3C) refers to SOA as "A set of components which can be invoked, and whose interface descriptions can be published and discovered". [7] The Service-Oriented Architecture (SOA) approach emerged in response to existing integration problems, related to too many protocols, too many representations and too many adapters.

SOA is based on a service concept and includes not only the IT-perspective but also the business perspective. Services are designed and deployed to match the customers/citizens needs.

Complex applications can be composed from services and exposed as services to humans and IT systems. SOA comprises the style of design that guides all aspects of the service life-cycle from the conception over the implementation to the deployment and maintenance, and reflects also mechanisms to define and to provide data exchange and business processes for the IT infrastructure. It provides a higher level of abstraction at which functionality can be specified, published and/or consumed compared to objects or components.
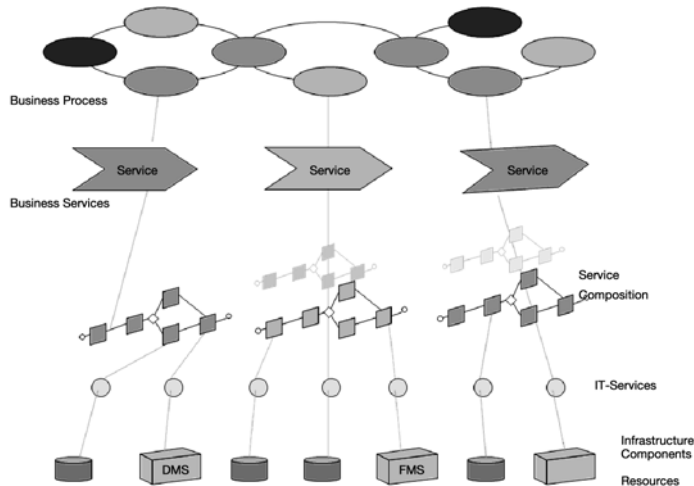
Figure 2: SOA Architectural view

In essence, SOA is an architectural approach that aligns business processes with business services, provides mechanism for service composition, allows for integration of legacy systems and integrates the infrastructure as shown in Figure 2. Both, processes and services need to be carefully coordinated to assure an effective SOA implementation.

While previous approaches had its focus more on the use of a specific execution environment technology, SOA focuses on the description of the business problem. The notion of service is not constrained by a specific type of technical implementation. It is transparent for a user of a service how the service is implemented, in other words, it does not matter if it is implemented using Java, Corba, .NET or a legacy language. The SOA communication infrastructure provides an easy way to use a service independent of its location. In a service-oriented architecture the infrastructure is called Enterprise Service Bus (ESB).

SOA's loose coupling principle is to avoid or at least encapsulate temporal, technology and organizational constraints, thus services can be easily orchestrated.

Loose coupling is a broad term that actually refers to several different elements of a service. Services can be used solely based on the published service contract and service-level agreement. The notion of loose coupling also avoids dependency so that, if a change is made to a service, the other services, which interact with this service, need not to be changed. The service itself publishes its interfaces in implementation-neutral formats and protocols, thus e.g. permitting location transparency.

The development of services shall not depend on a particular technology, product, or development platform. However, a commonly used technology for implementing services is Web services. The identification of a service is not an easy task, but it should not be tied to a single business process, so that it can be reused in many different processes and applications. This kind of reasoning is not new and represents solely the generalization of similar concepts, well known at the level of objects and components, now to the level of more complex autonomous applications, the services.

SOA provides flexibility that is a fundamental need in the e-government integration context due to the numerous applications. Usually these applications are distributed over many governments agencies, implemented on different operating systems and by different programming languages, and with distinct data models.

In addition to this flexible integration capability, SOA provides a universal mechanism to access and compose the services into a value-adding business solution. The process-oriented view in the context of eGovernment needs collaboration of services in order to support administrative business process chains.

Another issue addressed by SOA is the facility to reuse; once a service has been developed it can easily be reused in other business processes. Services have standard interfaces facilitating the access and the composition of these services in new business processes. Services can also be defined at different granularity levels, for example: a fine grained component service can be used for composition and described by workflow mechanism. A coarse grained service, such as a business service, can consist of the composition of these fines grained service components, which can also exist in external systems.

To perform administrative applications a service-oriented software infrastructure provides the runtime environment and manages and integrates these applications and the resources needed. The following types of services construct this infrastructure as depicted in Figure. 3. Some examples of these service types are listed below:

• Access Services: access for citizen, business and administration providing various technologies (portals, mobile access).

• Process control: coordination and automation of administrative process chains.
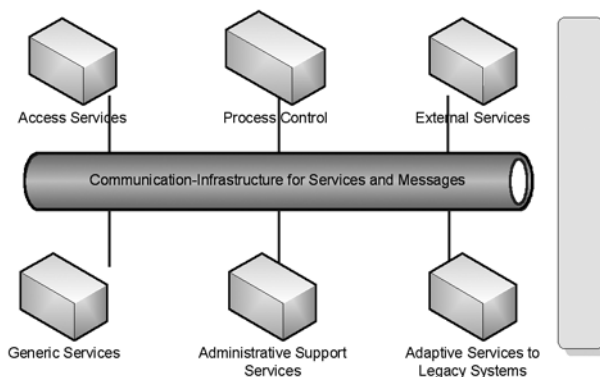
Figure 3: SOA for eGovernment

- External services: services from external providers (e.g. ePayment, certification authority services).

- Generic services: registries for people and services.

- Administrative Support Services: administrative services used by more than one eGovernment application (e.g. virtual post office).

- Adaptive Services to Legacy System: integration and adaptation services that hide the legacy system and expose it as a service.

- Service - and System Management including Security Services: management and control of the service - oriented software infrastructure.

EGOVERNMENT INTEROPERABILITY PROFILE

Governments, in general, are investing in nation-wide projects aiming to create eGovernment interoperability patterns. Most of them are encouraging the adoption of open standards such as: XML, SOAP, HTTP and SMTP. In many cases they give a special attention to Web services patterns; Web services are mentioned in documents of German SAGA, US Federal Enterprise Architecture, and EIF to name some. It is widely accepted that Web services emerge as the most popular technology to implement the abstract concept of SOA, which supports eGovernment integration by platform neutral interfaces, standard based connectivity and loose-coupled services. For this reason Web service interoperability has to be technically supported by specific open standards.

The Web Service Interoperability Organization (WS-I) defines a profile (WS-I Basic Profile 1.2) of existing standards to provide implementation guidelines for how related Web services specifications should be used together for best interoperability. The profile incorporates XML Schema v1.0, SOAP v1.1, WSDL v1.1, and UDDI v2 and X.509 and related bindings and defines extensibility points within them.

The WS-I Basic Security Profile (BSP) is an extension profile to the WS-I Basic Profile. This means it is consistent with the Basic Profile but defines additional functionality – e.g. to add conformant security features to the Basic Profile when needed. As an extension of the Basic Profile, the Basic Security Profile is designed to support the addition of security functionality to SOAP messaging, in an interoperable manner.

The WS-I Basic Security Profile 1.0 provides guidance on the use of WS-Security; it addresses Transport Layer Security, SOAP Message Security, Username Token Profile, Kerberos-, Rights Expression Language (REL) and SAML Tokens, Timestamps, X.509 Certificate Token Profile, XML-Signature, XML Encryption, Algorithms, Relationship of Basic Security Extension Profile to Basic Profile, and Attachment Security.

BPEL (Business Process Execution Language) defines an interoperable integration model between Web Services. It is an open XML based language for the formal specification of executable business processes and abstract business processes defining business interaction protocols. It describes executable workflow orchestrations, which are designed to describe modern business processes in a smart manner.

One of the key objectives while inventing BPEL was to standardize the definition format of process flows to actually make interaction with other business environments seamlessly and easy. The standardization was performed by OASIS and is named Web Services Business Process Execution Language (WSBPEL) v2.0. Most development environments provide a proprietary graphical notation and corresponding wizards to specify BPEL programs thus the BPEL programmer will not recognize the XML basics of the language.

SWEB ARCHITECTURE

SWEB ("Secure, interoperable cross border m-services contributing towards a trustful European cooperation with the non-EU member Western Balkan countries") is an EU international cooperation project that aims to develop a secure, interoperable, open and affordable government platform upon which secure cross-border mobile government services can be built. These services address governmental organizations, citizens and companies and will facilitate the creation of a more citizen-centred form of government.

The impressing penetration rates of mobile networks in Western Balkans give the unique opportunity to the countries in the region to use mobile services and accelerate their entrance in the digital society. This gives the advantage to the regional public administrations to skip a step and enter directly the mobile Government.

SWEB reuses some of the results of the eMayor project (www.emayor.org), a successful eGovernment security project in which five Municipalities - Siena, Psychico in Athens, Aachen, Bolzano, Seville - decided and tested two secure cross border e-government services. The eMayor platform is built from EJB components implementing basic services. Some of them, like components responsible for notification of users, task management, Web GUI, etc. are reused for the SWEB platform after required updates. However, many components are implemented from scratch in order to realise innovative way of mobile access to the SWEB platform.

Moreover, there are architectural changes/updates to the eMayor platform that are necessary in order for the SWEB platform to provide reliable and secure mobile access to its users and efficient services composition. These updates concentrate on the architectural structure based on SOA, having a specific focus on technical and semantic interoperability as well as on mobile access and security services for public administrations. Technical interoperability in SWEB comprises service integration and interoperability aspects, i.e. the support of services working across multiple devices (mobile and fixed) platforms and computing networks, the usage of specialized adapters to integrate existing services with proprietary interfaces and newly developed services with different eGovernment platforms using standard-based open interfaces.

A main concern of different governments is the semantic interoperability, i.e. data models and interchange formats between administrations. SWEB will not define the generic data models, as this is regarded as an activity to be performed on national and pan-European level. For example an online 'Semantic Interoperability Centre' was established as part of the IDABC website, enabling publication of news and updates, providing links and information to current initiatives and serving as an XML information hub.

The already carried out analysis in eMayor made it clear that, in spite of the great diversity of public services, they have very similar process structures. One of the reasons for this is that the long term development of bureaucracy may lead to a sort of tradition, transferred from organization to organization. Anyway, public services are somehow quite similar everywhere. At first, they provide information for the citizen of any kind of administration issues. Then there are the requests for applications, for example when opening a new business or applying for a new passport. For this kind of applications the processes are quite similar, request order, including, if necessary, identification check, perform order, get payment and deliver application form. The order in the process might vary, but not significant. The difference is lying partly in its grade of process automation. Some of them may not have all activities automated; some need specific adaptation because they have specific requirements. Based on these findings SWEB concentrates on the Security Services (as introduced in Figure 3) to support mobile and secure eGovernment applications. The architecture proposed is depicted in Figure 4.

- According to the generic SOA for eGovernment in Figure 3, SWEB comprises various services with the focus on mobile requirements: Security and Access Services: Mobile and secure browser based access services for citizen, business and administration are the main access channels.

- Process control: Coordination of administrative process chains is provided by administration and orchestration services, which enforce a role based access to resources and coordinate the interaction between the various services.

- External services: External services are the PKI and Time stamping authorities required for secure authentication with public key certificates, electronic signatures and non-repudiation.

- Generic services: Services will register in a UDDI registry.
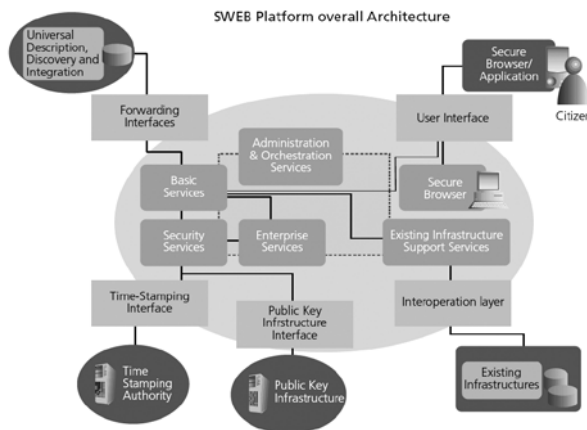
Figure 4: The SWEB Architecture

- Adaptive Services to Legacy System: Integration and adaptation services are handled by the Interoperation layer to connect to the existing infrastructures of the participating municipalities.

In the currently executed implementation phase of SWEB the mentioned services are implemented in detail.

FUTURE ACTIVITIES

SWEB currently implements the Web services that will realize a SOA for governmental applications supporting mobile access and taking into account the specific security.

The Web services will be tested in pilot environments with two services:

• Residence Certification Service: as a specific example for a secure municipal document exchange service, in which a public organization and individual citizens can securely communicate e/m-municipal documents.

• Electronic/Mobile Invoicing, which has a critical role in all the stages of handling Value Added Tax (VAT) procedures for EU Member States. Through e/m-invoicing, tax administrators will be able to implement new tools and procedures to carry out alternative controls.

Before the tests of the platform in the pilot environment will start a special training for civil servants of involved municipalities will be organized. This training will not only teach users to use the platform but also to get first feedback about the platform from them. The feedback will be used on the next iteration of the implementation to refine the platform and eliminate defects.

ACKNOWLEDGMENTS

DISCLAIMER

This document has been produced with the financial assistance of the European Community. The views expressed herein are those of SWEB Consortium and can therefore in no way be taken to reflect the official opinion of the European Commission. The information in this document is provided as is and no guarantee or warranty is given to state that the information is fit for any particular purpose. The user therefore uses the information at their sole risk and availability.

REFERENCES

1. SWEB Project Homepage, at http://www.sweb-project.org/

2. eGovernment Handbook, Center for Democracy and technology, at http://www.cdt.org/egov/handbook/.

3. World Bank Group: A Definition of e-Government, at http://www1.worldbank.org/publicsector/egov/definition.htm.

4. OECD: Checklist for e-Government Leaders, September, 2003, at http://www.oecd.org/dataoecd/62/58/11923037.pdf .

5. IDABC, European Interoperability Framework for pan-European eGovernment Services (EIF), Version 1.0, November 2004, at http://europa.eu.int/idabc/en/document/3761.

6. Gartner, Preparation for Update European Interoperability Framework 2.0, Final Report for IDABC, 4 June 2007, at http://ec.europa.eu/idabc/servlets/Doc?id=29727

7. W3C, "Web Services Glossary", 11 February 2004, at http://www.w3.org/TR/ws-gloss/ .

8. R. Reinecke, "Software-Infrastruktur für eGovernment, Einsatz von Anwendungsfällen", eGovernment Computing, 11/2006 (in German).

9. KBSt unit, Federal Ministry of the Interior of Germany: SAGA - Standards and Architectures for e-Government Applications, Version 3.0, October 2006, at http://www.kbst.bund.de/cln_047/nn_837392/SharedDocs/Anlagen-kbst/Saga/saga__3__0__en.html.

10. United Kingdom, e-GIF 6.1, 18 March 2005, at http://www.govtalk.gov.uk/schemas-standards/egif.asp

11. USA, Federal Enterprise Architecture (FEA), at http://www.whitehouse.gov/omb/egov/a-1-fea.html.

12. WS-I, Basic Profile Version 1.2, Working Group Approval Draft, 2007-10-24, at http://www.ws-i.org/Profiles/BasicProfile-1_2(WGAD).html

13. WS-I, Basic Security Profile Version 1.0, Final Material, 30 March 2007, at http://www.ws-i.org/Profiles/BasicSecurityProfile-1.0.html .

14. OASIS, Web Services Business Process Execution Language Version 2.0, OASIS Standard, 11 April 2007, at http://docs.oasis-open.org/wsbpel/2.0/OS/wsbpel-v2.0-OS.pdf.

15. IDABC, Speaking the same language: semantic interoperability for European services, April 2005, at http://europa.eu.int/idabc/en/document/4272 and IDABC, IDABC Semantic Interoperability Strategy: The European XML Clearinghouse, Feasibility Study, December 2005, at http://ec.europa.eu/idabc/servlets/Doc?id=24406. and Semantic Interoperability Center at: http://www.semic.eu/

An Identity Metasystem Approach to Improve Eid Interoperability and Assure Privacy Compliance

Andrea Valboni
Microsoft Italy,
Segrate Milano, Italy
andrea.valboni@microsoft.com

ABSTRACT

Just as individual identity is fundamental to our face-to-face interactions, digital identity is fundamental to our interactions in the online world. Unfortunately, many of the challenges associated with the Internet stem from the lack of widely deployed, easily understood, and secure identity solutions. This should come as no surprise. After all, the Internet was designed for sharing information, not for securely identifying users and protecting personal data. However, the rapid proliferation of online theft and deception and the widespread misuse of personal information are threatening to erode public trust in the Internet and thus limit its growth and potential.

Microsoft believes that no single identity management system will emerge and that efforts should instead be directed toward developing an overarching framework that connects different identity systems and sets out standards and protocols for ensuring the privacy and security of online interactions. Microsoft calls this concept the Identity Metasystem. The Identity Metasystem is not a specific product or solution, but rather an interoperable architecture that allows Internet users to use context-specific identities in their various online interactions. This paper describes the Identity Metasystem and shows how it can meaningfully advance Internet user privacy.

INTRODUCTION

An Internet user today cannot get far online without having to make certain claims about his digital identity, which in turn will affect his ability to purchase goods or services, communicate with others, and even access his personal information. These identity claims might be weak and lack any independent verification (such as submitting a user name to a Web site). Or they might be stronger claims backed by the assertions of other parties (such as a government-issued identifier or a credit card number). The identity claims required in any given situation will vary depending on the needs, desires, and aims of the parties involved. The type and amount of information we deem appropriate to disclose about ourselves online depends on the particular relationship we have with the other party. This is not unlike the physical world, where we are accustomed to a multitude of identity management systems and a variety of identifying ?tokens? — credit cards, loyalty cards, passports, identity cards, club membership cards, and so on. Adapting this familiar diversity of tokens for secure, private and convenient online use has not been easy.

This paper will describe Microsoft's approach to the problem of identity management on the Internet, which is based on the concept of the Identity Metasystem—a framework intended to connect different identity systems and offer standards and protocols for ensuring privacy and security online. It will also show how identity management solutions that conform to the Identity Metasystem will offer better privacy safeguards than solutions that rely on a monolithic approach.

NOTE ON TERMINOLOGY

The Identity Metasystem has *components* and *operators*.

The *components* include an identity selector (in Microsoft's case, we refer to this as Windows CardSpace) as well as software used by identity providers and relying parties (again in Microsoft's case, we refer to this as the Windows Communications Framework). Other software providers including IBM, Sun Microsystems, and many others are building similar components relying on the WS-* family of open web services protocols, including WS-Trust, WS-SecurityPolicy, and WSMetadetaExchange. These components taken together are also referred to as Information Card Technology.

The *operators* are various entities or organizations providing services by operating Identity Metasystem components (e.g., banks, governments, individuals, web sites, ISPs and so on). An Information Card is the visual icon and underlying metadata that is associated with a given digital identity. Thus, an operator who deploys Information Card technology might instruct a user to Log in with your Information Card. In this case, the user might be running MacOS, Linux, Windows, or be using a mobile phone, and the non-Windows identity selector software could show a set of Information Cards, just as would the Windows CardSpace software. Operators might also display a logo that represents a generic Information Card, as in Information Cards accepted here.

EXISTING ID CARD SCHEMES

Most people routinely use cards to pay for goods and services, enter the workplace, obtain cash from a bank machine, or identify themselves to government agencies. These ID card systems use various techniques to protect the security and integrity of personal data stored on the card, and they use a variety of standards and technologies to fulfill the authentication requirements of the issuing organizations. For example, many European governments are implementing programs to issue electronic national ID cards to citizens for various purposes such as border control, proving employment status, and facilitating citizens' online transactions with government departments. Although these ID card schemes have led to greater convenience in the delivery of services and have lowered certain risks of identity theft, they are not without controversy. For instance, they might lead to collection of more personal information than is needed or lead third-party organizations to make the ID card a prerequisite for receiving services. Most people are oblivious to such risks or simply accept them as unavoidable drawbacks of such schemes. Most people are oblivious to such risks or simply accept them as unavoidable drawbacks of such schemes.

ANONYMITY, PRIVACY, AND SECURITY

Anonymity means that others do not know one's personal identity (or personally identifiable information). Many of us are uncomfortable with the prospect of having our personal information shared with others without our knowledge or approval.

In a world characterized by intrusive direct marketing and unsolicited e-mail and telephone communications, our ability to remain anonymous or simply retain a sense of control over our personal information is threatened. By guarding our anonymity judiciously— both online and in the offline world—we can reduce the likelihood of identity theft, avoid the intrusion of unwanted solicitations, and protect our physical and emotional security.

Although ID card schemes are intended to offer a reliable means of identifying individuals and communicating identity claims, they also can allow others with whom we have no desire to form a relationship to acquire information about us. This is a form of ID creep, where the original ID takes on a further use that was never intended.

In the United States, for example, the government-issued Social Security number (SSN), which was intended to be used solely for administering social insurance entitlement, is often used by employers to identify employees, by universities to identify students, and by businesses to identify customers.

In the UK, the government has proposed a National Identity Register scheme whereby UK residents would have their biometrics enrolled in a central database and a log-file entry would be created each time a national ID card is used to access public or affiliated private-sector services.

Such large-scale identity systems also tend to involve a centralized authentication service or information hub, leading to a concentrated risk of unwarranted and improper data sharing among organizations connected to the hub. It is technically simple for information about an individual's transactions to be pooled from different sources. For example, information held by the government about each card holder as passport owner, benefit claimant, taxpayer, patient, and resident might be aggregated at a single point of reference, with all the attendant risks of improper information sharing, data mining, and profiling by government agencies and even private enterprises. The use of centralized data repositories carries the added risk of having a single point of failure.

Privacy intrusions can also arise from the process of applying for an ID card, such as when an applicant is required to submit more information than is appropriate or relevant given the card's intended function.

For instance, it would be unduly intrusive and improper for a retailer to demand that customers divulge information about their religious beliefs in order to obtain a store credit card. In principle, technological advances that produce smarter ID cards can address all of these problems, but in practice, privacy risks receive insufficient attention at the design stage. Or they may arise from disproportionate and improper processing of the card holder's personal information by third parties who are not part of the original identity relationship but instead misuse the card as a convenient way to identify the card holder.

For example, a hotel should not insist upon a government-issued benefits identification card in order to rent a room for the night. The hotel has no reason to collect or store the information in such a card and doing so only heightens the risks of improper data use.

THE IDENTITY METASYSTEM

The Identity Metasystem is based on the premise that no single, universal identity management system will emerge on the Internet, and that attempts to create one are misguided and, in fact, counterproductive with respect to security and privacy. What is needed instead is an overarching frame-work that enables identity systems to interoperate with one another by exchanging context-specific tokens of identity in online interactions.

The Identity Metasystem is a set of protocols that will connect existing identity systems, in the same way that the advent of TCP/IP in the 1980s enabled the interoperability of networks that used Ethernet, Token Ring, ArcNet, or Frame Relay as the underlying layer.

The system will allow a variety of technologies from many IT vendors to recognize each other and publish their service requirements and capabilities through a common set of standards and design principles. Existing vendor-neutral communication standards based on SOAP and XML will make this possible. These include WS-Security, WS-Trust, WSMetadataExchange, and WS-SecurityPolicy. And, from a privacy perspective, the Identity Metasystem does not entail Microsoft or anyone else acting as a central repository of users' personal information, or as a root of trust for verifying identity. Instead, a multiplicity of public and private institutions will manage digital identities using a plurality of technologies from many IT vendors.

THE SEVEN LAWS OF IDENTITY

The Identity Metasystem is based on seven universal design principles developed by Kim Cameron of Microsoft, extensively refined through the Blogsphere, which he has named the Laws of Identity. Long experience has proven that these principles are essential to maintaining good online security and privacy.

Systems that breach these laws tend to fail, moreover, all of the laws together are necessary to safeguard against the security and privacy problems associated with centralized, monolithic ID systems.

We describe each law briefly below:

• **User control and consent (Law 1)**. The user must be able to verify that parties requesting identity related claims are legitimate, and the purposes for which the information is sought must be transparent to the user. This principle recognizes that without user control and consent, an identity system will fail to earn the user's trust or sustain it over the long term.

- **Minimal disclosure for a constrained use (Law 2)**. Identity systems should solicit only the amount of identifying information needed for a given context and limit use of that information to purposes relevant to that context. For example, an identity system should not procure or retain an address and telephone number simply because they might prove useful at some future time.

- **Justifiable parties (Law 3)**. Personal information should be disclosed only to parties who have a necessary and justifiable place in the identity relationship. Users must be aware of whom they are interacting with when making identity claims and who will receive their identifying information.

- **Directed identity (Law 4)**. The system must support both omni-directional identifiers, which act as a beacon to all the world (such as company URLs) and uni-directional identifiers, which are limited to a particular relationship between two parties (such as a user interacting with a bank online).

- **Pluralism of operators and technologies (Law 5)**. The system must accommodate diverse technologies used by different operators in different contexts. In fact, it should encourage the coexistence of a plurality of operators and technologies.

- **Human integration (Law 6)**. To be truly secure, the system must be perceived by human users as highly reliable and predictable. The more subjective, ambiguous, or complex the user interfaces are, the less secure the entire system will be.

- **Consistent user experience across contexts (Law 7)**. Diverse identity systems should interact with users in a consistent and uniform manner while still allowing for different underlying technologies. Ideally, people will develop a reliable intuition about how to manage a plurality of digital identities safely, just as people manage a wallet filled with cards or a ring of keys. As in the real world, people can pick and choose the identity that suits them best for each occasion.

ROLES

The Identity Metasystem includes three central roles. (A given party can assume more than one of these roles).

- **Identity provider**: The person or organization that issues a digital identity, either on its own or on another's behalf. For example, an online bookseller might issue identities to its customers, a government might issue identities to its employees, or a third-party service might issue identity tokens verifying age for use at another site.

- **Relying party**: The person or organization requiring a digital identity before granting access to a user or processing a customer order. A relying party can specify the identity claims it requires and the formats it accepts and process credentials from multiple identity providers.

- **Digital subject**: The individual or entity about whom identity claims are made.

INFORMATION CARD TECHNOLOGY

The general architecture of the Information Card technology is fairly straightforward. It uses the metaphor of an ID card to describe a digital identity. An Information Card does not contain personal data.

Rather, it acts as a pointer to the identity provider of the card, which in turn supplies encoded identity claims about the user when a relying party requests them and the user authorizes their release.

Microsoft refers to its processing engine for this operation as Windows CardSpace. It determines which of the user's available Information Cards can meet the relying party's identity requirements. When a user clicks on an Information Card from her portfolio of identities, Windows CardSpace obtains security tokens containing identity claims from the identity provider that issued the card.

The Information Cards Model is based on the Identity Selector Interoperability Profile V 1.0 as described in [8] and it is based on the following design principles:

- **Browser independent**: A goal was to ensure that the protocols developed for using Information Cards on web sites could be implemented by a broad range of web browsers on the platforms of their choice.

- **Web server independent**: A closely-related goal was to ensure that the protocols developed for Information Cards on web sites could be used by web-based applications running on a broad range of web servers on the platforms of their choice.

- **Minimal impact on web sites**: A goal was to facilitate the adoption of Information Cards on existing web sites by requiring as few changes to them as possible.

- **Seamless browser integration**: A goal was that Information Cards should be viewed as a seamless security feature that is a natural extension of the browser(s) being used.

- **Seamless user experience**: A goal was that the Information Card web integration design should permit graceful fallback when a browser or platform does not have Information Card support available.

- **Work with browser high security settings**: A goal was that the mechanisms chosen should remain enabled even when browser security settings are set to high.

The resulting implementation available in CardSpace is an attempt to balance among all these sometimes competing goals and to achieve all of them as well as possible.

The Information Card architecture is best understood by observing its operation. The following sections describe the two primary scenarios in which Information Card technology interacts with Web sites.

In the most basic case, the Web site provides all the relying party functionality via HTML extensions transported over HTTPS. The second case is similar except the relying party employs Security Token Server (STS).[7]

Scenario One: Basic Protocol
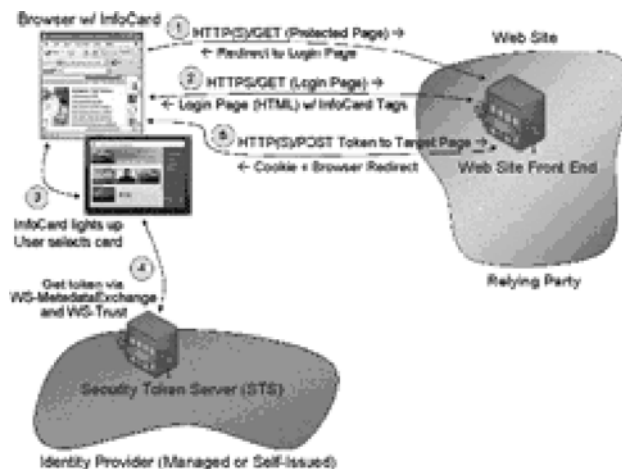
Figure 1. Basic Protocol Flow when using Information Card for authentication at a web site.

Figure 1 shows an example of the basic protocol flow when using an Information Card to authenticate an individual at a Web site that employs no relying party STS. Steps 1, 2, and 5 are essentially the same as for a typical forms-based login. The key difference is that the login page returned to the browser in step 2 contains an HTML tag that allows the user to choose an Information Card for authentication at the site.

When the user selects this tag, the browser invokes the Information Card protocols and user experience, and it triggers steps 3 through 5.

In step 3, the browser invokes Windows CardSpace, passing it parameter values supplied by the Information Card HTML tag. With Windows CardSpace, the user then chooses an Information Card and authenticates herself at that site. Step 4 uses standard Identity Metasystem protocols to retrieve a security token that represents the digital identity selected by the user from the STS as the identity provider for that identity.

In step 5, the browser posts the token back to the Web site using a HTTP(S)/POST. The Web site validates the token, completing the user's Information Card–based authentication to the Web site. Following authentication, the Web site typically writes a client-side browser cookie and redirects the browser back to the protected page.

Note that this cookie is likely to be exactly the same cookie that the site would have written back had the user been authenticated via some other means, such as a forms-based login using a username and password.

The impact on Web sites is minimal. Other than its authentication subsystem, the bulk of a Web site's code can remain completely unaware that Information Card–based authentication has been used. The site just uses the same kinds of cookies that it always has.

Scenario Two: Protocol Flow with Relying Party STS

In the previous scenario, the Web site communicated with Windows CardSpace using only the HTML extensions enabling Information Card use, transported over the normal browser HTTP or HTTPS channel. In this second scenario, the Web site also employs a relying party STS to do part of the work of authenticating the user, passing the result of that authentication to the login page via HTTP(S) POST.

A site might choose this solution for a number of reasons. One reason might be that the same relying party STS can be used to do the authentication work for both browser-based applications and smart client applications that use Web services. Second, this solution allows the bulk of the authentication work to be done on servers dedicated to this purpose, rather than on the Web site's front-end servers. Finally, this solution enables front-end servers to accept site-specific tokens rather than the potentially more general or more complicated authentication tokens issued by identity providers.
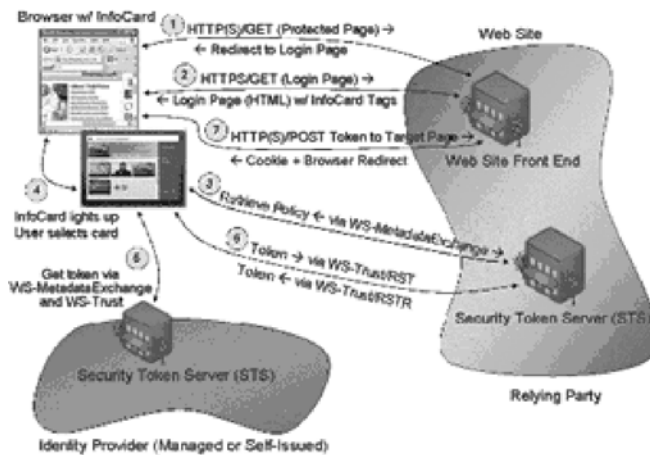
Figure 2. Information Card flow to authenticate at a Web site that employs a relying party STS

This scenario is similar to the previous one, with the addition of steps 3 and 6. The differences start with the Information Card information supplied to the browser by the Web site in step 2. In the previous scenario, the site encoded its WS-Security Policy information using Information Card HTML extensions and supplied them directly to the Information Card–extended browser. In this scenario, the site uses different Information Card HTML extensions in the step 2 reply to specify which relying party STS should be contacted to obtain the WS-Security Policy information.

In step 3, Windows CardSpace contacts the relying party STS specified by the Web site and obtains its WS-Security Policy information via WS-Metadata Exchange. In step 4, the Windows CardSpace user interface is shown and the user selects an Information Card to use at the site. In step 5, the identity provider is contacted to obtain a security token for the selected digital identity. In step 6, the security token is sent to the Web site's relying party STS to authenticate the user, and a site-specific authentication token is returned to Windows CardSpace. Finally, in step 7, the browser posts the token obtained in step 6 back to the Web site using HTTP(S)/POST.

The Web site validates the token, completing the user's Information Card–based authentication to the Web site. Following authentication, the Web site typically writes a client-side browser cookie and redirects the browser back to the protected page.

Information Cards Implementations

Since its first announcement, Information Cards technology drove the attention of many players in the IT space. Thanks to the Interoperability Profile, it is actually possible to implement the Information Cards protocol on different platforms and with different languages. Here follows a list of third party implementations of the technology described in the previous sections:

- PingIdentity (www.pingidentity.com) developed InformationCard-C, a low level library available on multiple platform for the processing of submitted identity information based on the Information Card Profile. A PHP extension exist which allows the single sign on into Drupal CMS, and open source CMS product;

- JinformationCard is a project aimed at developing a Java library which allows a single sign on capability using Information Cards technology to support Apache Tomcat, JBoss and SUN Application Server platforms running on Windows or Linux. The project was developed by the Fraunhofer Institute FOKUS in Germany;

- InformationCard-PHP is build on top of the Zend Framework (http://framework.zend.com/manual/en/zend.infocard.html) and allow consumption of Information Cards by a relaying party;

- Information Card Ruby provides a rail plugin and supporting library for integrating personal information cards to the Ruby on Rails (http://www.rubyonrails.org/) relying party web application;

- ICSynergy has extended OpenSSO from SUN to include CardSpace as a simple authentication module.

Moreover, in June 2008 a non-profit foundation, The Information Card Foundation (www.informationcard.net), has been started by Equifax, Google, Microsoft, Novell, Oracle, and PayPal, plus nine leaders in the technology community to promote the rapid build-out and adoption of Internet-enabled digital identities using Information Cards.

EU DATA PRIVACY LAWS AND INFORMATION CARDS

The Information Card technology, by operating in accordance with the Laws of Identity, will materially assist the principal online parties—identity providers and relying parties—in satisfying key requirement set forth arising under EU data privacy laws. Compliance also depends on responsible implementation and use of the technology, however. The technology itself cannot ensure that the relevant parties fully or even substantially comply with EU, or any other, privacy laws.

That said, we believe that the Information Card technology, by conforming to the Laws of Identity, is hardwired to comply with data privacy laws and protects privacy in four primary respects: legitimate processing, proportionate processing, security, and restraints on secondary use.

Legitimate Processing The Information Card technology will help to ensure that any processing of personal data by the relevant identity providers and relying parties is legitimate, and therefore legal, by virtue of taking place only with the user's unambiguous consent (Article 7 of the Directive). In the Information Card model, users have control over whether and when to acquire and use an Information Card to access any online services. Use of a particular card in a given context reflects the user's informed choice of what personal data to share, first with the identity provider (to obtain a satisfactory card) and then with the relying party (to access services). Information Cards are also designed so that before a user acquires a particular card, he will see a link to the privacy policy of the identity provider describing how any personal data submitted will be used. This is particularly important when the identity provider intends to use any submitted data for purposes other than issuing the card. Similarly, before a particular card is deployed to a relying party, the user will see a link to the relying party's privacy policy and can learn whether the relying party intends to use the data for purposes beyond identity verification. The Information Card model thus allows the user to make not merely a choice, but an informed choice as called for by the Directive[5].

Proportionate Processing Information Cards also foster adherence to the requirement that organizations process only the minimum amount of personal data needed to accomplish desired aims. This principle of proportionate processing finds expression in Article 6 of the Directive. Delivering suitable identity claims (and associated personal data) that match a relying party's specific needs—rather than data that bears no relevance to the contemplated interaction—is one of the defining features of the Information Card model. As we have seen, traditional wide-scale ID card schemes involve the creation of a single card containing personal data that is used to identify the card holder in a wide array of identity relationships, including those where some or much of the information on the card is excessive in light of the relying party's actual needs. So, while one Relying Party may legitimately need to know the card holder's home address and have access to a photo of the holder, another may just need to know that the individual is over the age of 18. Information Cards allow users to tailor the submission of their personal data to meet the particular needs of an online service provider by selecting the appropriate Information Card containing the necessary identity claims. For service providers that require more extensive personal data, users will be shown Information Cards that transmit a security token containing the appropriate identity claims. For service providers requiring less information, other Information Cards will be shown. If the user considers the information excessive, he or she can simply withhold use of the identified Information Cards. In this way, Information Cards help to ensure that service providers only receive personal data that are adequate, relevant and not excessive.

NOTES

[5] While consistent with current privacy law and practices, this approach should be considered only a first step. There is evidence that many users fail to review the terms of privacy policies or act on them in an informed manner. Far better would be a system enabling web sites to represent priva-cy policies in a simple, iconic fashion analogous to food labels. This would allow consumers to see at a glance how a site's practices compared to those of other Web sites using a small number of universally accepted visual icons that were both secure against spoofing and verified by a trusted third party. This more refined approach is a long-term objective of many privacy advocates and one that Microsoft strongly supports.

Security The Information Card model is designed so that the relevant disclosures of personal data among users, identity providers, and relying parties takes place under secure conditions, as required by EU laws. Article 17 of the Directive states that an organization must implement appropriate technical and organizational measures to protect personal data against accidental or unlawful destruction or accidental loss, alteration, unauthorized disclosure or access. As noted earlier, inadequate security is a failing common to many ID card schemes, particularly those involving the accumulation of card holder data in a single repository or database. Information Cards, however, contain a number of features that will enhance the security of the user's personal data when used for purposes of online identification.

The Information Cards that appear to users on their computer screen will not contain any personal data and thus cannot become a target for hackers and others. The cards are simply tokens that enable the flow of encoded identity claims from identity providers to relying parties. Further, unlike most wide-scale ID card schemes, the Information Card model does not entail the creation of a dedicated data repository or database for the storage of users' personal data. Identity providers and relying parties will still receive personal data, of course, and be responsible for ensuring that it is kept secure.

Further, in the Information Card model the request for and issuance of a security token containing identity claims requires strong two-way authentication. Security tokens re-turned by the user's identity selector to a service provider are encrypted by Windows CardSpace (if they have not already been encrypted by the identity provider) to guarantee that only the relying party approved by the user can examine the contents of the security token. Information Cards also help prevent the tracking of the user's online behavior by identity providers. Windows CardSpace, by default, will not disclose the relying party's identity to the identity provider when requesting security tokens from it. Also, the initial request and receipt of an Information Card token from any given identity provider will be subject to its own authentication process.

Limits on Secondary Use
Finally, Information Cards will serve to deter identity providers and relying parties from engaging in impermissible, secondary processing of user personal data. This finality principle finds expression in Article 7 of the Directive, which states that personal data cannot be further processed by a data controller in a way that is incompatible with the original, identified purposes. As noted earlier, the default setting in Windows CardSpace is that identity providers will not learn the identity of the relying party, which could enable them to construct a detailed user profile. The Information Card technology also makes sure that the privacy policies of both relying parties and identity providers are communicated to users in an intelligible form, which would reveal to the user any intended secondary uses of the personal data. Of course, organizations can ignore their own policies, but not without violating EU data privacy laws.

Thus, in at least four respects—legitimate processing, proportionate processing, security, and limits on secondary use—the Information Card model directly promotes compliance with EU data privacy laws. These privacy-enabling features of Information Cards are simply a byproduct of adherence to the Identity Metasystem and its governing principles. Microsoft believes that other identity management systems built according to the precepts of the Identity Metasystem can have similarly beneficial consequences for user privacy. The Information Card model is only one of many potential approaches.

ACKNOWLEDGMENTS

REFERENCES

[1] London School of Economics, June 2005, The Identity Project: An Assessment of the UK Identity Cards Bill and Its Implications, available at (http://is2.lse.ac.uk/idcard/identityreport.pdf)

[2] National Academies Press, 2003, Who Goes There: Authentication Through the Lens of Privacy for a discussion of privacy concerns in authentication systems.

[3] See Recommendation 3 in Tony Mansfield and Marek Rejman-Greene, Feasibility Study on the Use of Bio-metricsin an Entitlement Scheme (for UKPS, DVLA and Home Office), February 2003 (http://www.identitycards.gov.uk/library/feasibility_study031111_v2.pdf˙) (link now defunct).

[4] Michael B. Jones, The Identity Metasystem: A User-Centric, Inclusive Web Authentication Solution, Position Paper for the W3C Workshop on Transparency and Usability of Authentication (2005), (http://research.microsoft.com/~mbj/papers/InfoCard_W3C_Web_Authentication.pdf)

[5] Kim Cameron, Laws of Identity, http://msdn.microsoft.com/en-us/library/ms996456.aspx

[6] Kim Cameron and Michael B. Jones, The Design Rationale Behind the Identity Metasystem Architecture, http://www.identityblog.com/wp-content/resources/design_rationale.pdf for further discussion of roles in the Identity Metasystem and related architectural issues.

[7] For an exhaustive discussion on how to use the Information Card protocol within applications and browsers see Michael B. Jones, Microsoft Corporation, A guide to supporting Information Cards within web applications and browsers as of Windows CardSpace 1.0" at http://msdn.microsoft.com/en-us/library/aa480726.aspx

[8] Arun Nanda, Microsoft Corporation, Identity Selector Interoperability Profile V 1.0, http://msdn.microsoft.com/it-it/netframework/aa663320(en-us).aspx

[9] https://zeno.fokus.fraunhofer.de/MiniShop/home.jsp

[10] Martin Gee, ICSynergy International, Securing Site Access with CardSpace and OpenSSO: an overview, http://developers.sun.com/identity/reference/techart/cardspace.html

Towards Interoperable Infrastructures of Geospatial Data

Sergio Farruggia
GIS Consultant
eSDI-Net+ Committed Expert
Genova, Italy
sergio.farruggia@fastwebnet.it

Emanuele Roccatagliata
Geographic Information System
International Group, GISIG
Genova, Italy
e.roccatagliata@gisig.it

ABSTRACT

The development of a Spatial Data Infrastructure (SDI) comes true thanks also to the ability and the will to carry out communication and cooperation solutions and processes suitable to this aim. Two activities are described in this paper: a methodology for evaluating sub-national SDIs and a collection of the SDI user perspectives.

The information achieved regarding user needs offers the opportunity to point out different aspects that have to be taken into account to develop interoperable infrastructures of geospatial data.

KEYWORDS

Geospatial Data, Geospatial Services, SDI, User Requirements.

INTRODUCTION

The continued advances in remote sensing, mapping and geospatial technologies, including an increasing variety of data acquisition capabilities and low cost and more powerful computing capacity, coupled with the development of geographic information system technology, have enabled and increased the demand for geographic information. As the importance of geographic information in addressing complex social, environmental, and economic issues facing the diverse communities around the globe is growing, the establishment of a Spatial Data Infrastructure (SDI) to support the sharing and use of this data locally, nationally and transnationally makes increasing sense.

Despite the promising frame just described and the great efforts being made since the early 1990s, GI users -a part from rare exceptions- still have troubles in searching, discovering and exploiting geospatial data of the Public Sector. On the other hand there has been recently an explosion of interest in using web to create, assemble and disseminate geo-information.

Thanks to the participation in two GI e-Content projects, precisely eSDI-Net+[6] and GIS4EU[7], GISIG has the opportunity to follow its duties, related to dissemination activities and the user need collection, trying to take into account the rapid changes of user perspectives.

The Google Earth phenomenon

In October 2004 Google bought a company called Keyhole Inc., which developed a product called Earth Viewer. Earth Viewer was renamed in 2005 and launched as Google Earth. Since this date, the Google commitment in making geographic information useful and accessible on the web has continued with a non-stop sequence of initiatives. In October 2006, it undertook huge updates to Google Maps API, displaying Keyhole Markup Language (KML), and it announced licensing and support for businesses wanting to embed a Google Maps experience in their websites or internal applications. In May 2007, at the Where 2.0 conference in San Jose (CA), the Mountain View company announced the most innovative maps available on line: Street View and Mapplets, a new feature of Google Maps that enables users to view and navigate within 360 degree street level imagery.

In April 2008 Street View was integrated to Google Earth. In the same month the Open GIS Consortium (OGC) approves KML as an Open Standard, so the OGC KML will be maintained by the consortium.

These are only some of the news, for instance, to give an idea regarding the rapid growth of Google commitment in Geographic Information field: the release of Google Earth, more than any other of its competitors, caused a driving public interest in geospatial technologies and applications.

The network of SDIs

The concept of the "Spatial Data Infrastructure" started taking shape during the early 1990s, when the Mapping Science Committee (MSC) of US-National Research Council coined the phrase "National Spatial Data Infrastructure" to identify a comprehensive and co-ordinated environment for the production, management, dissemination, and use of spatial data. The NSDI was conceived to be the totality of the policies, technology, institutions, data and individuals that were producing and using geospatial data within the US.

NOTES

[6] eSDI-Net+, European Network on Geographic Information Enrichment and Reuse, n. ECP-2006-GEO-320005/2007,http://www.esdinetplus.eu/
[7] GIS4EU, Provision of Interoperable datasets to open GI to the EU communities, n. ECP-2006-GEO-310011/2007, http://www.gisig.it/gis4eu/

The MSC report (1993) proposed a number of actions and responsibilities for various agencies and for the Federal Geographic Data Committee (FGDC) which related to their version of NSDI whilst another report a year later urged the use of partnerships in creating the NSDI. The FGDC team discussed the concept of NSDI with the Clinton Administration. The NSDI was recognised as an idea and means to foster better intergovernmental relations, to empower State and local governments in the development of geospatial data sets and to improve the performance of the Federal Government. In 1994, the national Spatial Data Infrastructure was signed by President Clinton, directing the federal agencies to carry out certain tasks to implement the NSDI.

After the US-NSDI other Countries started with analogous projects as Australia, Canada, Japan and so on. In 2002 the European Commission also launched a project, named INSPIRE[8], that aims to create the European Spatial Data Infrastructure.

At the heart of the US-NSDI there were at the beginning very pragmatic concepts as a reduction of the deficit and to guarantee a more efficient use of the billion-per-year dollars spent to acquire and manage geospatial data. Over the time the objectives of an SDI have been enlarged, including the promotion of the geospatial data use and the re-use for various aims by public administrations and citizens as well as the organization of the necessary services to allow the collectivity to discover and exploit them.

The web underpins co-operative approaches

From the user point of view there are various elements of confusion between the Google offer (as well other its competitors) and that can be achieved by an SDI. What it seems is that even if Google spatial data are often less accurate than SDI ones, its services are immediately ready, user friendly and universally known. So, various public GI services are offered on Google-based ones.

Comparing the two initiatives in terms of developing timeframe, it is even too easy to point out the fast result of Google, that in less than four years reached a leadership in the www. With this overture, can we image which other big jump it will be able to do into 2013, the foreseen date to have a complete implementation of the INSPIRE directive at EU member State level.

At a first examination, such great difference between the results of the two initiatives could be traced back to investment differences or revenue opportunities, thinking that the Google business model is based on the advertising market, a very profitable one. But anyhow, also Public Sector has dedicated in the same period a considerable number of investments, for GI in general and for SDI developing programmes too: some estimations regarding this matter should be useful. Are we so sure that the result differences are owing only to financial aspects?

So, it is possible to analyse this subject from another point of view. Both Google and SDI GI products and services arose and are growing inside the Internet new era.

NOTES
[8] http://inspire.jrc.it/

Google is designed taking advantage of the www network characteristics, concerning the scale-free degree distribution[9], it contributes to diffuse the Web 2.0 model, so that Google solutions strongly underpin the spontaneous development of a new way to manage and use GI on the web, e.g. Mashup and Volunteered Geography[10]. On the other side, the web diffusion of SDIs -and of the network of SDIs as a consequence- doesn't ride the wave of this innovation as well.

Obviously, Public Sector approach to the www is still not very suitable, it is still not consistent with respect to the main paradigms of the Society of Knowledge.

International and national SDI associations, as well as single experts are connected in a network: perhaps its size and its characteristics are not still proportionate to exploit the web power. But too many public organizations who should be committed in the development of owner SDI and to contribute to the improvement of the SDI network are dismissing opportunities that SDI development means for GI users and for themselves.

Just as the theory of Public Administration is evolving to take into account changes of our society[11], so also operative approaches have to try opportunities of co-operation between public organizations, as well as between public, private and research sectors and -in general- with the web communities.

With respect to this context, eSDI-Net+ project aims to bring together existing SDI key players and target users in a Thematic Network to be established as a platform for communication and exchange between different stakeholders involved in the creation and use of SDIs.

AN EUROPEAN NETWORK ON GEOGRAPHIC INFORMATION

eSDI-Net+ network intends to promote high-level decisions, low-level technical discussion and information exchange, in order to increase awareness concerning the importance of GI enrichment and of SDI's for GI reuse, to allow an integrated view of the experts and to permit the creation of integrated guidelines, standards, and implementation of best practices.

Within the network, communication mechanisms between the European and local levels are implemented to maximize the benefits of INSPIRE, GMES and GALILEO, regarding digital GI content.

With eSDI-Net+, multicultural and multilingual aspects in accessing, exploiting, using, and reusing digital GI content in Europe are addressed. As a result, the project wants to contribute to achieving interoperability between national digital collections and services (e.g. through common standards) and facilitating access and use of the material in a multilingual context.

NOTES

[9] Barabási, Albert-László, Linked. The New Science of Networks, Perseus Publishing (2002)

[10] Goodchild, Michael F., Citizens as sensors: the world of volunteered geography, GeoJournal (2007), available at http://www.ncgia.ucsb.edu/projects/vgi/docs/position/Goodchild_VGI2007.pdf

[11] Only referring to the last two decades, three models have been introduced to take into account citizen perspectives; see, e.g. http://en.wikipedia.org/wiki/Public_administration

With eSDI-Net+, multicultural and multilingual aspects in accessing, exploiting, using, and reusing digital GI content in Europe are addressed. As a result, the project wants to contribute to achieving interoperability between national digital collections and services (e.g. through common standards) and facilitating access and use of the material in a multilingual context. A first goal of the project is the evaluation of sub-national SDIs in Europe, in order to select SDI best practices. In the next sub-section the methodology carried out to that end is described. The results of this activity will be discussed in national workshops ,scheduled in last quarter of 2008.

A METHODOLOGY FOR DESCRIBING SUB-NATIONAL SDI

The first issue of the methodology concerns the standardization of the area-of-interest sizes at the sub-national level. In the context of eSDI-Net+, sub-national means NUTS 1, NUTS 2, NUTS 3 levels or any of their aggregations according to the administrative structure of the countries, referring to the nomenclature defined by of the European statistical office EUROSTAT.

Once this aspect was detailed, several key SDI questions that each sub-national SDI, identified by the national level, have to elaborate on, were identified.

A questionnaire was elaborated, as a guideline for interviews of sub-national SDI officials, for recording the results of the national workshops and for the relationship with the eSDI-Net+ project. Seven topic categories were proposed and synthetically shown hereinafter.

1.3.1. Sub-national SDI identity card
This part regarding the "SDI register data" such as objective, legal status, funding mechanisms and so on.

1.3.2 SDI usage assessment
This section intends to assess the sub-national SDI usage. In particular, questions concerning this aspect are:

• The sub-national SDI objective regarding the usage.

• The assessment of SDI usage from the sub-national SDI stakeholders, its effective use and the user expectation for SDI services.

• Social impacts of the sub-national SDI.

1.3.3 Networking people assessment
This section intends to understand the networking issue the sub-national SDI has to face. It relates to the "humanware" and tries to identify what exists beyond the digital façade (the emerged part of the iceberg visible on the net). Two main aspects have to be investigated:

• The sub-national SDI may have set up networking people mechanisms in order to create a climate of opinion, to identify common interest, shared interest, and to build consensus.

• The sub-national SDI may have addressed issues related to raising awareness.

1.3.4 Socio-economic impact analysis

The fourth topic category concerns the evaluation of the sub-national SDI undertaking with respect to socio- The fourth topic category concerns the evaluation of the sub-national SDI undertaking with respect to socio-economic impact analysis. To assess this aspect, one can use different methods such as cost benefit analysis, cost avoidance. The objective here is to collect results if any, and identify innovative methods.

1.3.5 Organisational assessment

This section intends to assess the place of the sub-national SDI in the overall organisation of the territory.

Main aspects to investigate in this section are:

• Links between Sub-national SDI and the administrative area governance.

• Funding required by sub-national SDI and the team to operate it.

• Suggestions would like to channel to the EC with respect to the European statements that the Regions should undertake regarding sub-national SDI (e.g. in the modernisation and IT area, not only produce data but also enable data sharing).

• Any remarkable aspect regarding joining with sub-sub-national SDI in the area covered by the sub-national SDI.

1.3.6 Coping with legal aspects

Legal aspects of sub-national SDI are two fold. On the one hand it copes with the laws and regulations that the SDI has to comply with and on the other hand what is the legal status that the SDI should have to reach sustainability.

1.3.7 Technical functionalities-facilities-components

Technical facilities are related to the type of data involved within the sub-national SDI and the services offered to the users. As other initiatives are focusing on technical aspects of SDI, for example the INSPIRE state of play, the methodology is not looking fort details on the technical aspects.

THE USER ROLE IN SDI DEVELOPMENT

An activity that can contribute to the sub-national evaluation is the analysis of the SDI user perspectives, conducted by GISIG inside GIS4EU project.

GIS4EU aims to develop a common data model, harmonisation, aggregation and data exposition rules and guidelines in order to enable access to consistent and homogenous reference data, regarding four themes (administration units, hydrography, transportation networks and elevation) provided by cartographic authorities from different countries and levels (national, regional and local) without building one central database and service.

This work was subdivided in two phases. In the first an analysis of the available literature on this matter, made considering the results obtained by previous user requirement surveys, was carried out.

The achieved information gave the opportunity to point out the role of users in SDI development and a method to improve user role in SDI development was suggested. In particular, a checklist was formulated to be used as a structured and uniform tool for assessing and evaluating the feasibility of developing an SDI and as a hint for deliberation for those public organizations that have already, partially or totally, developed GI services.

In the second phase, the same tool was then submitted to various SDI managers and people in charge of SDI organizations to obtain, through the checklist use and the resulting answers, confirmation about user requirements collected from previous surveys, as well as other information about this matter and, in general, comments and suggestions derived from the knowledge of perspectives of their users.

User Identification and User Classification

Geographical Information users are many and various and include users in the environmental field who need spatial data for planning, management, assessment, monitoring and reporting. But the range of users includes as well those ones from many other application sectors: Agriculture, Forestry, Mining and geological industry, Fishery, Transport, Utilities, Construction, Property agents, Logistics, Health and Government, and many others.

Nowadays, as a consequence of the increasing number of available technological communication platforms (connected to the Internet and mobile, and without forgetting the forthcoming ones in a near future, e.g. from the merge of Internet and digital TV) many new applications of geospatial technology are present and will arise year by year[12].

Besides this, to identify GI users, the context of new paradigms also has to be taken into account, e.g. the WEB2.0 (namely in our matter WHERE 2.0) as well as new disciplines such as Neogeography[13], whose scope and application is currently object of debate (but anyway connected with the increase of user-generated geospatial content).

Hence the user community is very broad and diverse and includes: Governments & Administrations, Utility and Public Services, Research and development, Commercial & Professional End Users, Non Governmental Organisations (NGOs) as well as not-for-profit organizations and Citizens.

With respect to the goals of GIS4EU project, generally speaking users are people who are using already existing SDIs and Thematic SDIs, able to highlight the main obstacles/problems they are facing.

Regardless of the SDI different scales, local, regional, national and international, a first classification of them is with respect to their role, as suggested in "State of Art in User Groups and Needs", Humboldt project[14]:

NOTES

[12] An example of the wide range of the possible application domains, is given in "The SDI Cookbook", 2004, http://www.gsdi.org/docs2004/Cookbook/cookbookV2.0.pdf
[13] See, e.g. http://en.wikipedia.org/wiki/Neogeography#Discussion_about_the_definition
[14] HUMBOLDT, 3.3-D2 State of the art in user groups and needs, 2008, http://www.esdi-humboldt.eu/home

- GIS developer, i.e. people who are doing programming jobs in the environment of GI Systems.

- GI data custodian, i.e. people/ institutions who have to provide data adapted to assigned standards (harmonised) – because of legal or market requirements.

- GI data integrator, i.e. people who have to use heterogeneous geodata to meet the requirements of their daily job.

- End users of geo data, i.e. people who are working with already harmonised geodata or geodata that doesn't need harmonisation or integration at all.

- End users of spatial information, i.e. users at a laypersons level, e.g. people who are using online services (not dealing with the real geodata).

Always having in mind the GIS4EU aims, a user of each previous class can be attribute to one of the following class:

- Public Administration Users, i.e., people who are working in a institutional context, regardless of the organization level (EU, national, regional and local).

- Public Organization End Users, i.e., users involved in specific organizational missions of agencies, authorities, public bodies (like port authorities, public IT consortia, environmental agencies, and so on).

- Private company Users, i.e., employs, managers and consultants who are working in software GI system developing and/or GI service deployment.

This classification was introduced in the "Study of the Socio-Economic Impact of the Spatial Data Infrastructure in the Region of Catalunya"[15]: In this first analysis research sector was not taken into account.

Overlapping these two categorization a match between requirements arising from user tasks or duties and from different organization missions can be achieved.

Review of user requirement survey activities done by previous projects

The analysis carried out on the previous user requirements/needs surveys[16] has allowed to collect a certain number of information regarding this topic, that is possible to synthetically resume here.

Some information gives a picture of the state of the art regarding particular components of SDIs, like metadata availability. In this regard, the INSPIRE metadata survey provides a first level of data that will allow to monitor change in practice and uptake of the INSPIRE implementing rules on metadata over time. For example, a matching between this first survey result and the foreseen eSDI-Net+ interview activity will can give more useful information about this subject, like scenarios will change after two years.

NOTES
[15] INSPIRE, Study of the Socio-Economic Impact of the SDI in the Region of Catalunya: Executive Summary, 2008
[16] In particular, INSPIRE and HUMBOLDT have already collected similar surveys.

With respect to the GIS4EU aims, the results of the HUMBOLDT user requirement survey has provided very useful indications regarding the main problems and obstacles encountered by a significant sample of users. In brief, as it could be expected, among the technical requirements, standardization and harmonization requirements play the dominant role, following by service requirements. On the side of non-technical requirements the biggest concern is connected to public data policy. Note that some users declared that to avoid losing time and energy before starting to work with public data, they are using data from pan-European private companies, like Teleatlas or Navteq. Another topic highlighted by users is training and know-how transfer. Users would highly appreciate a pragmatic, non-bureaucratic platform for the exchange of encountered problems and best practice experiences. These aspects are well confirmed when an SDI project is approached using business model: then it is possible to collect a great number of information about user needs, problems and behaviours in respect to opportunities offered by SDI services. In this regard, the results of the socio-economic impact study of the SDI in the Region of Catalunya is a remarkable collection of useful information. For example, while availability of metadata catalogue services is crucial, the activity of inventorying and updating could be a problem for users, above all in using the complex and extensive ISO format to do so.

In the end, while user technical requirements are identified and, in such a way, under control, contributes to improve the cultural changes in SDI planning and management are highly needed, so that the user perspectives are satisfied.

USER ROLE IN SDI DEVELOPMENT IMPROVEMENT

E-gov aims to transform traditional services into on-line ones. In the same manner of most e-gov projects, SDIs are often seen as "sum zero game": the system development costs are covered by funds (National or EU, Regional, etc.) and the system management costs are balanced by cost cutting to supply traditional products and services. But whilst the SDIs management costs are very expensive, the reduction of traditional geographical service costs doesn't take place, as a consequence of the small number of on-line users till now (few per cent). Moreover, very frequently (almost always) the GI services are supplied free of charge, while sometimes prices are defined for GI products (e.g. maps).

An alternative future to e-gov definitely doesn't exist any more, but, while waiting for an on-line increase of users, the cost problems are real and they risk delaying the SDIs' (and INSPIRE's) process development.

Following this vision, even for public SDI projects it would be better to take into account business model approaches and to use the same way every private entrepreneur would use before creating on-line services for his customers.

According to that, planning an SDI project means first of all the analysis of context and of SDI products and services demand: what are the products and services customers are waiting for and they consider the most useful; what is the user fragmentation (by field of interest, by professional activity, etc.); what is the added value (in terms of time and/or outlay costs saved) with respect to access to traditional ones.

Only after having collected this information it will be possible to draw up strict business plans regarding various SDI products and services, going on to define the addressed goals (how many traditional users we want to become digital customers and with respect to which services) and the indicators to be used to monitor the plan performances.

A method to improve awareness on User SDI role

A method to improve user role in SDI development is described. The aim is to supply a complementary methodological tool to add to those that have been developed and they are using for SDI projects. Moreover it seems that the proposed method is useful also in general to pick up users' requirements, supporting a better understanding of their world.

1.3.8 General strategy and implementation criteria

Taking into account the user points of view, when starting the planning of an SDI project the following criteria must be carefully considered and pursued:

• To incorporate the needs both of the internal and external users of the SDI Organizations involved in the project and to define solution suitable with respect to the needs expressed by those users.

• To verify the possibility of continuing to use products, tools, and skills already present within those Organizations and to exploit their contribution for the best project result.

• To verify the possible links with similar projects carried out or under development in other actors (private, public, research, …) of the SDI area of interest, proposing them collaboration agreements.

With respect to these points, the results of the user requirement survey conducted inside the HUMBOLDT project can be useful. In fact, the answers given by such user expert target in terms of:

• Main obstacles in using geodata from different sources.

• Main common problems in using geodata from different sources and …;

• … the solutions already implemented or expected to overcome these obstacles.

Can be taken into account as guideline, both as a help for evaluating the feasibility of developing an SDI and as a hint for new deliberation, for those public organizations which have already, partially or totally, developed an SDI.

According to previous developments of automation processes of geo-based information systems able to meet the needs, for example, of a region, even the time needed for an SDI planning and development could be considered to be a number of years to complete the main database and services and to be a longer period to consider its use as steady. Obviously, this time lapse is not suitable to have effects on practical and every day GI uses and it is too slow to benefit private sector.

Anyhow, within such a period both internal (the most common: a change of the political administrators) and external (e.g. a technological evolution) changes may happen that can influence (positively or not) the final result.

Starting from such background and considering that the reference context is not always favourable, it is always a wise policy to design a project development able along the time of using solutions not only reacting to the change but as well anticipating it. This development model is frequently adopted in the entrepreneurial context to help enterprises in changing according with the change of the markets and of the society.

In other words it can be useful to try two parallel and simultaneous strategies: the first one targeting the short-term management, then limited to recognise and to address the past and present problems; the second one targeting future scenarios and hypotheses. That twofold approach can be applied to three different levels: the organisational structure, the external context interacting with it, the widest societal context.

1.3.9 Strategy in the short term
In a pragmatic approach the short term project management strategy can be summarised as the identification of specific actions needed to fulfil the programmes coping with the present situation, that is the assignment of tasks to people involved and a joint definition of the plans for the realisation of those tasks. Within a project that is complex as SDI development is, and when this project is managed by a structure internal to the body and interacting continuously with the organisation, the actual implementation of the programmes becomes then the key element of the short term strategy (focus on project management).

As the Catalan SDI study highlights very well, while the measurement of an SDI costs is easy to achieve, the evaluation of benefits is more difficult. Benefits are subdivided in three categories:

- Efficiency benefits (e.g. time or money saved …).

- Effectiveness benefits (e.g. better integration data and IT platforms, …).

- Social-political benefits.

The first and the second category concern mainly the evaluation of so-called tangible benefits: they are essential for the private sector, to evaluate if such an innovation submitted could be approved. They are quantifiable in the private sector because it is used to apply operative control methods. Instead, the evaluation of such benefits is usually a problem for public sector because data of the "status quo" doesn't exist and consequently it is not possible to estimate the changes driven by innovation. Of course, this is due to a reason: usually, the adoption of a innovation is underpinned by the promulgation of new laws or norms, so "it must go independently from the costs". Further, the culture of controlling management is still "young": this justifies the difficult to acquire data that allows this evaluation to be done.

On the contrary, according to his main aim (voter satisfaction) public sector is a bit more able to estimate intangible benefits. They have in fact experience in defining indicators and in recording them and their changes along the time. However, because the concept of an SDI is still rather new inside of public administrations, actions should be identified in order to:

- Allow that the process for the creation of a SDI is incorporated into the Authorities.

- Foster awareness in these organisations, top-down starting from the management, so that the system control formulation takes into account the requirements about SDI in a non-sectoral form.

To overcome the above mentioned obstacles the identification of indicators to measure the impacts of the SDI and their status quo evaluation is essential. In this regard, the methodology applied to the study of SDI of Catalonia is an excellent example.

Moreover, to guarantee a careful realisation of the programmes, communication is of fundamental importance. An efficient communication starts with a broad participation of the overall working group, even open to users, in the planning process.

1.3.10 Organisational improvement factors
We are shortly giving below some hints concerning various factors that can favour the start-up of anticipatory strategies which could be taken into consideration and applied to a structure responsible for an SDI project carried out with a pragmatic approach.

1.3.11 Becoming more entrepreneurial
To have an entrepreneurial vision of a project means to pursue the opportunities of its development even outside the resources available at the moment.

1.3.12 Becoming more participatory
The experience shows which fundamental role could have to work in team: solutions to specific problems can come from a single individual but the realisation normally requires a wider involvement.

1.3.13 Becoming more users' needs oriented
As a company that does not understand in time the new requests by the market can face losses of market share, reduction in the competition margin and increasing difference between the prices applied and those competitors, in the same way an SDI project could face a rapid deterioration of the co-operative relationships in case changes in users' trends are not timely assessed, with a consequent lose of interest in the service itself.

1.3.14 Becoming flatter and slimmer
The staff engaged in SDI development is, for some functions and/or specific periods, a duplication of structures already pre-existing within user organizations. For this reason it should have a hierarchical structure which allows a faster and more adequate decision-making to follow users' needs.

1.3.15 Becoming faster
The peculiarities of an SDI project (complexity, strong innovation value, but also risks to meet resistance) suggest to proceed as fast as possible, particularly in the initial phases. That means to acquire trust, to demonstrate reliability, to convert hostile behaviours.

1.3.16 Becoming more integrated
One of the winning cards to ensure the success of an SDI project is to find advanced ways to manage the growing participation requests from the users and to integrate the different bodies. These integration aims have to pursued for the different levels of interaction:

- The first level is internal to the structure of body.

- The second level includes the bodies and the companies with which the SDI organization interacts.

- The third level concerns the relationships which is appropriate and useful to establish with other SDI bodies of the same level of one own Country.

- Finally, the last level concerns the integration of the own project with the initiatives promoted at a national level and, more in general, with the on-going processes at an international level.

Structured interviews and result description

As pointed out in the previous section, GI users are very spread on a wide range of technical domains: the rich information got by analysis of previous user requirement surveys has made us aware that an effective way to reach user requirements is through the consolidated knowledge that SDI organizations have already got from of their users and consequently of the needs that they bring. Unfortunately, studies like the one conducted in Catalunya are not still at the disposal of more SDIs; one of the reasons is a lack of market or business approach in SDI planning and management, as underlined in the previous section.

Our contribution was therefore oriented to formulate a checklist following the method described in the previous subsection. This tool was submitted to various SDI managers and people in charge of SDI organizations to obtain, through its use and the resulting answers, confirmation about user requirements collected from previous surveys, as well as other information about this matter and, in general, comments and suggestions derived from the knowledge of perspectives of their users.

Referring to the aim to bring into focus the change in the GI user perspectives owing to the change from traditional mapping to mass-market GI, the people interviewed confirmed that, among user technical requirements, standardization and harmonization play a very dominant role, followed by service requirements.

In particular, the questions concerning GIS4EU spatial data themes gave the opportunity to highlight two relevant subjects for the development of SDIs. The first concerns the "Administrative Units" theme: it is a common suggestion that the value of this information is closely linked to the possibility to access easily to the statistical information. Various SDI operators affirmed that users would like to access population distributions and other geo-statistics data for many applications (urban planning, environmental planning, transportation, geomarketing and so on). The second subject regarding "Transportation Network": operators in this field are committed to the improvement of vehicles and goods traceability. To do that, they need up-to-date information regarding transportation networks.

With respect to the answers collected by the checklist sections referred to the "Strategy in the short term" and "Organisational improvement factor" the following comments can be reported.

SDIs are still too planned and managed putting user needs not at the beginning of the process. The knowledge of user awareness with respect to the evolution from traditional GIS and SDI approach as well as only its involvement –at different levels- can guarantee good results, both in terms of efficiency and effectiveness. To reach this goal, improvements in the area of project management as well as the start-up of anticipatory strategies to target future scenarios and hypotheses are very useful. What we feel we must suggest is to use the checklist proposed also as a tool inside GIS4EU project, in order to have a hint with respect to the monitoring of GIS4EU feeling on user perspectives, considering that GIS4EU can be seen as a "brick" of an SDI.

The interviews allowed us to emphasize even some needs regarding non-technical aspects: as they were pointed out by the people interviewed. These issues risk delaying SDIs' process development (and INSPIRE's too).

Among them all, it is useful here to recall the following:

• A better knowledge and information transfer between data providers and data users.

• Less strict access rules to spatial data.

• Need for training and GI cultural improvement ("process of diffusion and awareness raising within Local Authority still has some way to go", Catalan SDI Study).

• Metadata management improvement and updating of data more frequently.

• Too many (and not clear) data access policies.

This study has pointed out some limits that will have to be taken into account for future GIS4EU activities and that will have to be gone into more thoroughly. They concern non-technical requirements and can synthesized by these statements:

• An awareness gap still exists between and user SDI and the people involved in the SDI development.

• Absolutely, GI Public Sector is lagging with respect to Private one.

Even if considering the GIS4EU objectives it would seem sufficient to fix one's attention on technical user requirements, partners of the consortium would take into account these aspects to avoid having difficulty with respect to the expected outcomes following the dissemination and awareness activities as well as those related to "Impact and follow-up" activities.

Data-provider partner, for example, during the progress of the "Specification of data models and harmonization processes", faced by research and technological partners, have the opportunity to analyse their metadata supply chain and, while contributing to the success of this task, they can even improve the quality of their meta datasets for the GIS4EU selected themes and –in general- the quality of the tools and services connected to the description of their data (i.e. glossaries, dictionaries, catalogues, and so on). Obviously, such a behaviour can be followed with respect to other components of their owner SDI (e.g. services) as well as over the development of the other project tasks.

The check list proposed would have to help them to "keep in touch" with their users and control their requirement evolution.

CONCLUSIONS

Let us consider the time lapse 2004-2007: while analysis of Public Sector Information (PSI) value was being conducted and the results emphasized the GI role; while the debate around the SD dissemination policies was (and still is) running GI, the private sector... enters into orbit. Not only was the Google Maps phenomenon arising and SDI users have learnt to apply these tools for their needs. But in the World Wide Web there is continually a lot of news regarding new GI companies, GI company acquisitions or amalgamations as well as information about new GI applications and services offered by the private sector.

Therefore, it is important to underline that a risk exists: perhaps, while Public Sector (and GIS4EU is a component of it) is looking for the best standards, interoperability, harmonization etc., the GI's world goes far without waiting: so problems have to be solved right now.

With respect to this vision, non-technical user requirements become at least as important as the technical ones and, as the market rules are teaching, both of them together are the engine of the GI development. Users would highly appreciate a pragmatic, non-bureaucratic platform for the exchange of encountered problems and best practice experiences.

Into this context what we suggest inside GIS4EU partnership is to keep relationships with other projects which are running at the same time, specifically with the working groups inside them, who are involved in user requirement monitoring activities.

As it is about establishing "a European Network on Geographic Information Enrichment and Reuse" the results of GIS4EU, as an example reported in terms of GI user satisfaction improvement, will be for sure an enrichment for that network. Just as the outcomes of eSDI-Net+ activities to assess SDI initiatives will be able to give many suggestions to GIS4EU partners.

The interoperability is a basic distinctiveness to allow communication and co-operation between systems, exchanging and using data through standard protocols and format. The attention for this subject, in all its different aspects (at the communication level, of data, of services, of semantics) cannot leave a cultural guidance that supports -paraphrasing the definition - the "interoperability of the organizations" in other words their capability in communication and co-operation, thanks to shared processes and methods, to satisfy the citizen and the enterprises requirements.

Single organizations and individuals are urged to share such ideas, to totally become organizations and individuals of the 21st Century. Geographical Information, thanks to the extent of "space" (technological, disciplinary and application-oriented, organizational) in which we operate, represents an ideal arena in which to play and valuate our attitudes and ability to accept the challenge of our age.

Modernization and Administrative Simplification Master Plan for the Local Councils of the Region of Murcia

Leandro Marín Muñoz
General Computing Manager of the Autonomous Government
Murcia, Region of Murcia, Spain
leandro.marin@carm.es

Pedro Olivares Sánchez
Regional Corporative Development Department Head
Murcia, Region of Murcia, Spain
pedro.olivares@carm.es

Isabel Belmonte Martínez
Local Council Adviser
Murcia, Region of Murcia, Spain
isabelm.belmonte@carm.es

ABSTRACT

In this paper, we describe the Modernization and Administrative Simplification Master Plan for the Local Councils of the Region of Murcia, an ambitious initiative by the Autonomous Government of the Region of Murcia which offers an online services set to the local councils and defines an interoperability and cooperation framework.

This framework allows to share services within the regional public administrations and to access to other public administrations services using SARA (Spanish public administrations network).

KEYWORDS

Interoperability. SOA. Regional Government. Local Government.

INTRODUCTION

The Autonomous Community of the Region of Murcia is one of Spain's seventeen autonomous communities, located in the Southeast of the country. The community measures 11,313 kmÇ and has a population of 1.2 million, of whom one-third live in the capital (Murcia). It comprises 45 municipalities, 30 of them with less than 20.000 inhabitants.

11/2007 Law ("Online Access Law for Public Services") was published in 20th June, 2007. It states the citizens right to online access to Spanish public administrations by 1st January, 2010.

The Local Council Office (LCO) of the Autonomous Government of the Region of Murcia, the Autonomous Government Office dedicated to support local councils, defined a Modernization and Administrative Simplification Master Plan for Region of Murcia Local Councils (MASMP) because there are many local councils which, due to their size and investment capability, cannot apply the ambitious 11/2007 law requirements.

The Computing Office (CO) of the Autonomous Government of the Region of Murcia collaboration was included in MASMP due to the eGovernment platform implantation experience in Autonomous Government.

With MASMP, we define a regional public administrations interoperability model (required by 11/2007 law) and we link this model to SARA network, which extends interoperability among public administrations beyond regional borders.

DESCRIPTION OF THE MODERNIZATION AND ADMINISTRATIVE SIMPLIFICATION MASTER PLAN

MASMP initial budget was 200.000 : 80.000 provided by a state subsidy and 120.000 by LCO funds. The public contract was finally assigned to Telvent Interactiva, S.A. (actual budget, 171.000).

The project participants are:

• Local Council Office: Promoter and Functional Management.

• Computing Office: Technical Management.

• Telvent Interactiva: Consultant company.

• 45 Region of Murcia City Councils: Stake-holders.

• Project Goals and Phases.

The main goals defined when the project started were:

• To create the organizational change instruments and the technological infrastructure required.

• To urge a modernization process focused to simplify the administrative procedures (defining a service catalog).

• To determine the technological infrastructure characteristics and the management model associated.

The project started in 2nd January, 2008 and will be finished on 30th September, 2008. It is divided in 3 phases, which will be explained later:

- Phase I: Current State Analysis.

- Phase II: Services and Processes Catalog Definition and eGovernment Model Definition.

- Phase III: Planning.

Phase I: Current State Analysis

The first project task was a current state analysis of the public administrations involved to determine project's Strengths, Weaknesses, Opportunities and Threats (SWOT analysis).

In the Autonomous Government, services provided by LCO to local councils (and their technological maturity level) were studied.

Besides, the CO eGovernment platform was analyzed. This platform is flexible, focused on service quality, on the improvement of the internal management, and on interoperability with internal back-office systems and with other public administrations or organizations.

It is based on a Service Oriented Architecture (SOA) and includes the elements necessary for online processing (authentication with public key certificates, digital signature, official online registry for applications, online payment,…), an Online Services Directory (in order to show a complete and unified view of the services offered to the citizens, companies and employees) and a unified Front-Office of the eGovernment services (in order to make online services easier to use for the citizens with the aim of standardizing the presentation layer and helping the citizens with the use of these services).

The communication model to share services between the central eGovernment platform and the Ministries and Autonomous Institutions Back-Offices (using a node called "eSatellite") can be easily extended to a multi-administration model.

The main work achieved on this phase was the study of the services provided to the citizens by all the local councils and also their technological maturity level.

To do this, a questionnaire was sent to the local councils and later visits were made to complete the questionnaire with the local council staff.

From this study, we concluded that a few city councils had a high technological level but many others offer only basic online services to their citizens (web information).

Finally, the services provided by the National Administration with the SARA network (Sistema de Aplicaciones y Redes para las Administraciones-Network and Software System for Administrations) were studied, as well as similar projects in other Autonomous Governments (i.e., Andalucía).

Phase II: Services and Processes Catalog Definition and eGovernment Model Definition

Throughout this phase (not finished yet), a new service model is being defined, with services from LCO to local councils and from local councils to citizenship. This model will be a multi-channel one (window office, phone, e-mail, Internet and so on) and must implement the 11/2007 law requirements with total legal warranty and improve the procedures efficiency and effectiveness using the Administrative Simplification. The key instrument for achieving these goals is the Administrative Simplification Committee (ASC).

Administrative Simplification Committee (ASC)
Administrative Simplification Committee major goal is to assure the administrative simplification process quality. In this committee there are Autonomous Government representatives (from LCO and CO), local council's representatives and Telvent's consultants. In order to achieve a better representation of the Region of Murcia local councils, we chose three of them, according to their population and technological development level:

- Large: Murcia (416.996 inhabitants).

- Medium: Molina de Segura (57.431 inhabitants).

- Small: Fuente Álamo (14.261 inhabitants).

ASC started from the Service Inventory (SI) defined on phase I and organized it in functional scopes (Culture, Education, Sports and so on) creating a Services Catalog (SC). This Services Catalog includes technological services (like e-signature) and 500 administrative services. From administrative services, an Administrative Procedures Inventory (API) was defined, identifying procedures channels and applicable laws.

KPI (Key Procedures Inventory) was defined including 40 of these procedures. The main criteria to choose these procedures were the repercussions in the citizenship, public administration cost reduction and widespread use. The procedures inclusion in the i2010 benchmarking was also assessed. Some of these processes are:

- Local taxes payment.

- Information and Complaints.

- Job vacancy.

- Public competitive exams for Local Administration.

- Civil wedding celebration in the city hall.

- Car park ticket for physically handicapped person.

- Civil servant training.

- Sport activity registration.

- Local sports facilities reservation.

- Course registration.

- Registration in the Municipal register of inhabitants.

These procedures were grouped in 17 generic administrative procedure families:

- Permissions.

- Grants.

- Certifications.

- Expropriations.

- Conciliation, intervention and arbitration.

- Information and complaints.

- Social and public health benefits.

- Agreements.

- Taxes.

- Human Resources.

- Procurement.

- Personnel selection.

- Patrimony responsibility.

- Administrative actuation checking.

- Property operations.

- Sanctions.

- Regulation elaboration.

- Treasury and Debt.

- Minors protection.

For each one of them, a Family Procedure Guide (FPG) was defined. This FPG included a procedure schema, concepts normalization and in/out documents associated. When the FPG were designed, the main goals were:

- To reduce the required administrative documentation.

- To normalize and simplify the forms.

- To standardize procedures, which allows to reduce the procedure time.

- To replace external procedures by internal procedures, supporting procedures steps in the data interchange with other public administrations (always taking into account personal data laws requirements).

- To improve the citizens' information accessibility, simplifying administrative language and increasing the number of channels to provide information.

To ascertain the usefulness and viability of the different alternatives when designing the FPGs, we evaluated the organizational impact, need of new resources, time required to implement the alternative and if it's aligned with eGovernment best-practices.

Key procedures where redesigned using these FPGs as a pattern, applying the family procedures homogenization to the key procedure flow-diagram and the normalized document models to the forms associated.

All these key procedures redesigned make up the Redesigned Procedure Guide (RPG). Finally, each one of them was included in the Online Procedures Catalog (OPC).
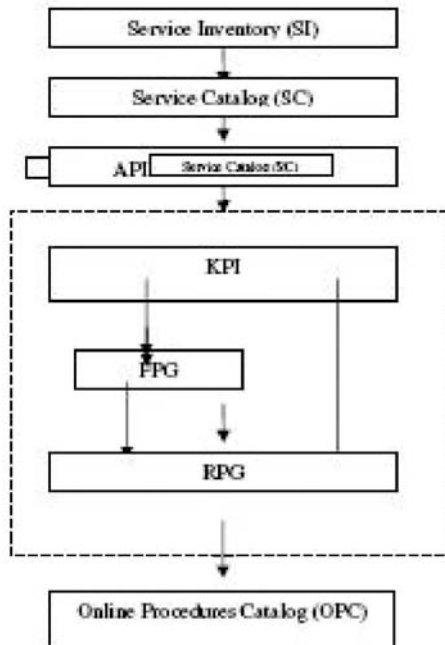
Figure1. Administrative Simplification Process

eGovernment model

The eGovernment platform must include the required functionality to implement the model service previously defined and be compliant with the generic technological requirements (scalability, flexibility, interoperability and so on).

Due to the city councils heterogeneous technological maturity level, a mixed eGovernment model is defined.

A city council should implement the eGovernment platform on its Data Center; in case the council couldn't afford it, it could also use an "eGovernment hosting" service provided by the Autonomous Government.

Phase III: Planning

This phase (not yet started when this paper was written) will generate an eGovernment model implantation proposal and an Online Procedures Catalog implantation proposal, both of them with time and resources associated.

IMPACT & RESULTS

Due to the project hasn't finished yet, it is not possible to evaluate the MASMP impact, but we can describe some results achieved in these last months:

• The Region of Murcia local councils "eGovernment state-of-the-art" is known.

• The LCO Catalog Services has been updated.

A generic procedure catalog for the local councils (the Family Procedure Guides) and a method to implement:

• Specific procedures included in a family have been established.

• An eGovernment model and an eGovernment platform which can be implemented on local or remote Data Center have been defined.

The implantation strategy and Master Plan evolution have not been defined yet.

LESSONS LEARNED

The main lesson learned in the phase I was the importance of political impulse for this project, in which it was necessary the availability of many civil servants from all the regional administrations (LCO, CO, 45 city councils) in a short period of time.

For the phase II we learnt the need to involve multidisciplinary teams (technical staff, jurist staff) to study the administrative procedures. We also learnt that it is not possible to implement only one eGovernment technological model when you have different kind of clients. We consider it was a good decision to include in ASC civil servants from city councils with diverse technological levels and resources availability.

FUTURE DEVELOPMENTS

When the Modernization and Administrative Simplification Master Plan for Region of Murcia Local Councils will be finished, the next actions will be to choose the eGovernment model suitable for each city council and to start the implementation and deployment.

ACKNOWLEDGMENTS

REFERENCES

[13] Online Access Law for Public Services, available at <http://www.boe.es/g/es/bases_datos/doc.php?coleccion=iberlex&id=2007/12352>

Organizational Interoperability and Organizing for Interoperability in eGovernment

Ralf Cimander
Institute for Information Management Bremen (ifib) / University of Bremen
Bremen, Germany
cimander@ifib.de

Herbert Kubicek
Institute for Information Management Bremen (ifib) / University of Bremen
Bremen, Germany
kubicek@ifib.de

ABSTRACT

Interoperability (IOP) is considered a critical success factor to forge ahead in the online provision of public services. Interoperability frameworks shall give guidance to practitioners what to consider and to do in order to enable seamless interaction within the own public administration as well as with other public authorities and clients. Moreover, IOP frameworks serve the allocation of the own system into a standardized scheme to allow for the assessment of similarities and differences with comparable systems. The European Interoperability Framework (EIF) is one of the best known of such frameworks. Like many other frameworks it is designed as a multi-layer model distinguishing between technical, semantic and organizational IOP. For achieving technical IOP, there are acknowledged standards, and for semantic IOP, recognized concepts and methods are available, however, aspects and characteristics of organizational IOP are still very heterogeneous. Nevertheless, organizational IOP is seen as an important stake factor for the success of e-government projects.

In a research project at the Institute for Information Management, an Institute affiliated to the University of Bremen, the constituting factors for achieving organizational IOP are being extracted by empirical analyses of a range of IOP-good practice cases, and ordered in a way to provide for a more detailed classification of organizational IOP. In a first step, the aspects that are concerned with supervision of e-government projects and legalization (generally referred to as 'governance') have been defined as one dimension of organizational IOP. In a second step, those factors that deal with the functional and technical set up of organizational IOP have been defined in two dimensions; the first is concerned with the choreography and alignment of business processes, while the second deals with the coordination of tasks and processes to concretely develop the choreography and alignment of business processes by technical and functional aspects. I.e. this dimension is concerned with the provision of technical and functional infrastructures that provide for the interoperation of different back-offices' IT-systems. The sub-division of organizational IOP into these three dimensions that –in turn – are classified in various aspects will then allow to more precisely encircle the different areas of action for public authorities and hence provide for identification of success factors for achieving organizational IOP.

KEYWORDS

E-Government, Organizational Interoperability, Integration of Information Systems, Governance, Interoperation, Centralization, Standardization.

INTRODUCTION

There is wide agreement in administrative practice and research that the use of ICT will only lead to savings and improvements if business processes are reorganized in order to allow for a seamless exchange of data between all agencies involved. In many public services, several back-offices are involved in the service supply chain. The data-processing systems in the back-offices of these agencies have to be merged or linked up to allow for a smooth online service provision. A particular problem is that a great number of legacy systems in these back-offices exist that do not have the aspired interfaces but are linked with other systems and fulfill the local requirements of the respective agency.

This means that reorganization cannot start from scratch. Rather there is a need for developing a strategy, which may provide a compromise between keeping local systems and still allowing for better data interchange. Referring to a Study of the European Commission on Back-office Reorganization one could generally say that better electronic public services can be achieved either by centralization of tasks and data or by standardization of data and workflows . In practice, the combination of both is prevalent.

In the Back-office Reorganization study it turned out that public services that have realized full or almost full centralization by integration of back-offices, high savings could be achieved. This means that tasks and data and their corresponding IT-systems were merged under one authority.

A different concept, however, concerns those public services that – for various reasons – cannot fully centralize their tasks and data. Reasons are, e.g., legalization that explicitly forbids central data storage, or too many actors are involved with their own running systems, or personal sensitivities exist, etc. Hence, these authorities need to link up their IT-systems and processes in a way to allow for a smooth and efficient online service provision.

This concept uses the standardization of data and functionalities and often appears in combination with the centralization of service-parts like, e.g., a central directory with address data or data conversion services. If these centralized databases or functionalities are operated (but not maintained) by a third party, we speak of clearing services provided by a clearing house. Certainly, the more different IT-systems and actors are involved, the more complicated is the agreement on and the deployment of such standards. Providing for the linking of different IT-systems by use of standards and/or clearing, we call back-office integration by interoperability.

To sum up, efficient electronic public services may either be achieved by integration of back-offices through centralization or through standardization and/or clearing, i.e. through interoperability.

This definition of integration and interoperability is also supported by the European Interoperability Framework which defines IOP as "the ability of information and communication technology (ICT) systems and of the business processes they support to exchange data and to enable sharing of information and knowledge". So, if no data are exchanged among ICTs, there will be no interoperability, but integration may have taken place by centralization. As achieving interoperability in practice is generally much more challenging and prevalent than centralization, the authors indeed honor the success of centralized public services but focus on interoperability in the present paper, in particular by developing a classification model for interoperability.

More precisely, this paper looks at the different layers of interoperability - namely the technical, syntactic, semantic and organizational layers – from a political and managerial point of view applying the concept of governance in order to find out how IOP is achieved and maintained for efficient e-government services. It starts with a review of different IOP frameworks in order to define what has to be made interoperable and then argues that for clarification of the term interoperability, the governance aspect of negotiation and establishment of standards, rules and institutional arrangements on the one side has to be separated from the technical and functional provisions as well as the organization and management of the provision and maintenance of interoperation on the other side. For all three dimensions empirical indicators are proposed and applied to cases of intergovernmental online services within the European Union in order to arrive at an empirically assessed taxonomy, on which future comparative empirically research could build and investigate, which institutional arrangements have been chosen for achieving IOP of different services or for similar services in different countries.

The cases which form the empirical basis of this research have been collected in a study on IOP for the European Commission within the MODINIS program. More than 70 case descriptions have been collected and are available in an online database (http://www.egov-iop.ifib.de). For 32 of these cases, extensive descriptions have been produced in cooperation with the case owners and published on the Good Practice Framework of the European Commission (http://www.epractice.eu/cases). Further analysis of these cases is subject of a research grant provided by the German Research Foundation (Deutsche Forschungsgemeinschaft), started in May 2008. In this paper, a preliminary operationalization of the organizational dimensions is presented in order to receive feedback by the expert community with regard to plausibility and usefulness for general discussions as well as for planning interoperability projects. Therefore comments to this paper are highly welcome and will be considered in the ongoing research heading for a refinement of the classification presented here.

REVIEW OF SELECTED INTEROPERABILITY FRAMEWORKS

The European Commission has launched a Communication with particular focus on Interoperability for Pan-European eGovernment Services. But interoperability is also of great importance for the e-government development in each Member State. The periodic benchmarking study of e-government in Europe explains differences of progress between Member States to a large extent by differences in achieving interoperability within and between services at the same or on different government levels.

111

The European Interoperability Framework (EIF), developed in the IDABC context (Interoperable Delivery of European eGovernment Services to public Administrations, Businesses and Citizens – see http://ec.europa.eu/idabc/) has established itself as a reference model for several national IOP programs of Member States. At present it is under review and a new version is expected by end 2008. Similar to the EIF, there are interoperability initiatives, frameworks or programs within the e-government plans of most Member States. They are summarized in the MODINIS Study on IOP mentioned above. Several international bodies have developed interoperability frameworks as well or give recommendations for successful achievement.

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

• The European Interoperability Framework for Pan-European E-Government Services, which was developed within the EU program IDABC, differentiates the three levels of technical, semantic and organizational interoperability. The draft of the second version that is currently under review covers also the levels of legal IOP and the political context.

• In a similar architectural model of the European Public Administration Network (EPAN), the level of structured customer contact and support is introduced and, besides the four levels, the aspect of governance is highlighted.

• In a white paper with the title "Standards for Business", the European standardization institute ETSI introduces the level of syntactic interoperability between the technical and the semantic interoperability.

An overview over these and other classifications is given by Peristeras and Tarabanis. On the basis of a comparison of twelve different interoperability frameworks, Peristeras and Tarabanis suggest a concept of their own which they call "The Connection, Communication, Consolidation, Collaboration Interoperability Framework ". The four terms characterize the functions or purposes, which the standards shall fulfill on the different levels of the mentioned framework concepts. The mostly technology-oriented studies, especially a comprehensive "Study on Interoperability at Local and Regional Level" within the MODINIS program of the European Commission and the White Paper of the Fraunhofer Institute for Open Communication Systems, adopt the structure of three levels from the European Interoperability Framework. Moreover, the MODINIS Study on Interoperability has in addition assessed the information needs of stakeholders in interoperability and discusses the barriers and success factors for achieving interoperability.

The Computing Technology Industry Association (CompTIA) has reviewed the EIF with regard to the experiences of the ICT industry and its requirements to organizational IOP in particular in B2G and G2G relations.

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

While there are global standards and protocols for the levels of technical and syntactic interoperability and recognized concepts and methods exist for the semantic interoperability, very heterogeneous elements and aspects are assigned to the level of organizational interoperability, which are described only vaguely or which formulate requirements instead of options for action as at the other levels. Only the ICT Industry Recommendations to the EIF that analyses the EIF from the viewpoint of the Computing Technology Industry Association go one step further and describe more precisely the options by defining the IOP layers more differentiated.

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

Table1. Four levels of interoperability

Considering barriers and success factors, many experts agree that organizational interoperability constitutes the biggest challenge for the successful implementation of interoperable multi-level e-government systems.

In the above-mentioned survey on information needs regarding interoperability, organizational interoperability was ranked highest. However, compared to the layers of technical and semantic interoperability, for organizational interoperability

• The definitions are much more heterogeneous.

• The assigned issues are much more vague.

• There are almost no classifications of options available for solving these issues.

The following box quotes the definitions of organizational interoperability in selected frameworks.

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

Definition of organizational interoperability in different framework concepts

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

IDABC EIF draft of v.2.0
Organisational interoperability concerns a broad set of elements of interaction, including business processes, business interfaces such as email, web portals, etc., business events within and between administrations, and "life" events, involving the external parties: businesses and citizens. This aspect of interoperability is concerned with how different organisations such as different Member State Administrations collaborate to achieve their mutually beneficial, mutually agreed eGovernment service-related goals. The partners need to reach detailed agreements on how their processes will interact (synchronize and cooperate) in order to deliver "public services where needed". Organisational Interoperability in practice means the seamless integration of business processes and the exchange of information that they manage between the organisations. (from EIF v1). Organisational Interoperability aims at addressing the requirements of the user community by making services available, easily identifiable, accessible and user-oriented. Organisational interoperability occurs when actors agree on the why and the when of exchanging information, on common rules to ensure it occurs safely, with minimal overhead, on an ongoing basis, and then draw up plans to do all these things, and carry them out.

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

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

114

The definitions of organizational interoperability mix methods and standards for the technical linkage of business processes (process organization) with questions of the organization of support functions, which cannot be assigned to one layer only, but which apply to all layers of interoperability as cross-sectional aspects. Though the more differentiated definition of organizational IOP in the draft of the new EIF v. 2.0 this situation has not changed.

"WHO" ORGANIZES "WHAT" and "HOW"?
Compared to the other frameworks, the EPAN framework provides greater conceptual clarity by separating the dimension of governance from the other layers and considering this aspect as a cross-cutting issue concerning all layers of IOP. Also the draft of the new EIF 2.0 now more clearly separates the governance aspect and, moreover, separates the legal and political aspects from organizational IOP. Also, the (above mentioned) ICT Industry Recommendations to the EIF [20] differentiate between those aspects that are based on legislation, regulations and court findings on the one side and the technical and functional aspects of IOP on the other. In other words, IOP frameworks should distinguish between "What" is standardized and "Who" develops and establishes these standards. In addition, from the analyses of the cases, a third aspect and dimension refers to "How" operation and maintenance of IOP standards is organized (cf. Fig. 1).

"What"
The technical and functional concepts to achieve organizational IOP refer to the alignment respectively coordination of business processes by standards for process modeling, architectures or choreographies. This meets the results of the empirical research of the MODINIS IOP Study cases as well as the classification by the ICT Industry Recommendations to the EIF [20]. According to the definition of technical, syntactic and semantic IOP which is confined to technical and functional standards, this aspect of organizational IOP also has to build on technical and functional standards. In order to avoid misunderstanding and to more clearly indicate the dimensions of organizational IOP, this "What" – dimension is named Business Process IOP. Foremost concepts and implementations (technologies) cover e.g. Service-Oriented Architectures by using standardized business process definition languages to enable the delivery of software processing as services. Practical implementations of such technical and functional concepts are Web services defined, e.g., in WSDL (Web Services Definition Language) or as BPML (Business Process Modeling Language).

"Who"
The aspect of "Who" organizes for IOP refers to the governance of e-government services. However, there is not one common governance structure for all layers of interoperability. Rather protocols at the technical layer are mostly defined by national and international standardization committees including Internet working groups, while data formats, ontologies and so forth for creating semantic interoperability are - due to their more concrete relation to a particular context - mostly developed by industrial or sectoral organizations (industrial associations, professional bodies, local government associations, etc.); in public administration they are also provided by ordinances and legislation. Regulations concerning organizational interoperability are either negotiated by the administrations directly concerned or by superior administrative agencies or ordinances. However, this aspect of governance is not defined and structured in the EPAN document.

How

The means by which IOP is being established through the technical and functional concepts are more complex, as various combinations of standards (e.g. data exchange standards, ontologies) and technical infrastructures (e.g. directories, interfaces) exist. Interoperation can, e.g., be achieved by implementation of the same (standardized) directories of services in different authorities or by a technical functionality that allows for the conversion of different data formats that are in use for the same service in cooperating back-offices. This means that the "How" aspect refers to the concrete standards, and infrastructures data are used to achieve IOP.

By analyzing data exchange in industry and retailing, we found that ordering and billing information are not exchanged directly between retailing and producers of brand articles, but via mediators providing certain services such as conversion of data formats, providing up-to-date directories, authentication or authorization services and many more. They can be called clearing houses generalizing from the inter-bank clearing . Similar is the situation in the evaluated e-invoicing good practice cases of the MODINIS Study where so-called Value Added Networks (VANS) centrally take over conversion and routing services. Many other services, which employ such intermediary infrastructure, could be named.
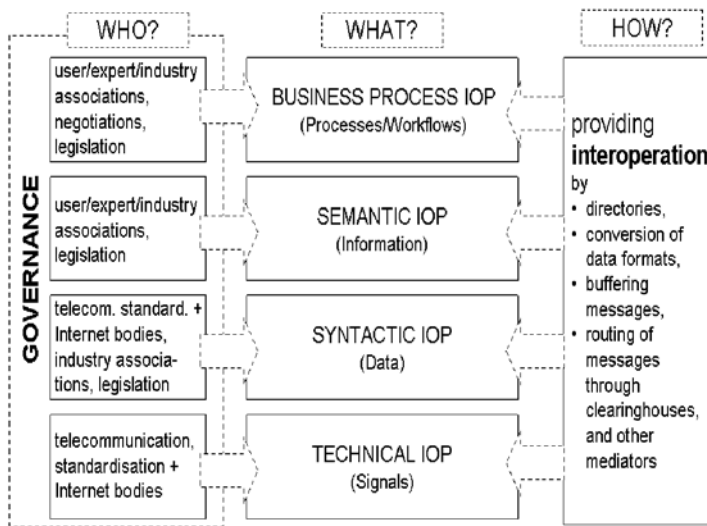
Figure1 Layers of interoperability, their Governance and Provision

To summarize this discussion, we suggest to differentiate between three dimensions of organizational interoperability, reserving the term business process IOP for technical standards for linking workflows and business and separating this from two cross-cutting aspects of governance of developing and establishing IOP on one side and providing its daily operation on the other (cf. Table 2).

Organizational Interoperability		
Governance	Alignment of business processes	Interoperation

Table 2. Organizational Interoperability

In the next two paragraphs we will propose sub-dimensions and empirical indicators, derived from the Good Practice case collection in order to differentiate relevant aspects and available options.

The Governance of Interoperability ("Who")
At this moment there is no classification available on the different arenas where in particular semantic and organizational interoperability have been negotiated and decided. Some hints can be found in the TERREGOV organizational case studies . There are different forms of governance for different areas of public administration and differences between Member States according to differences in constitutions and traditions of cooperation between administrative sectors and levels.

While the research on intergovernmental cooperation for achieving interoperability allows for deeper insight, it is mostly case-based and does also not provide a classification of the different forms of governance for achieving semantic and organizational interoperability. Also in e-government research, the governance aspect is mostly addressed very globally by referring to the three basic forms of market, hierarchy and networks as e.g. in the MODINIS IOP Study, or concrete constellations of individual cases are described.

When trying to apply the suggested governance forms to the 32 cases evaluated in detail in the MODINIS Study[17] we found that there was not only one governance structure in each case. Rather the planning and decision-making authority shifted in the course of three different phases of the development process.

Phase Dependent Governance
In a conceptualization phase we found the working groups and ad hoc committees mentioned by Scholl and Klischewski [18] as well as staff units, mainly composed of experts from the respective application contexts and ICT specialists. The organizational forms in this phase can be distinguished by the degree of institutionalization and representation.

Sometimes the IOP standards at the organizational and semantic level are elaborated in existing permanent institutions, sometimes by ad hoc groups put together for a particular IOP project (cf. Table 3).

Representation refers to the extent to which the different sectors or levels of government, which will be affected by a standard, are represented in the respective working group (cf. Table 4).

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

Table 3. Degree of Institutionalization

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

Table 4. Degree of Representation

Standards elaborated by such working groups are in most cases proposals, which have to be adopted, issued, recommended or made mandatory by authorized bodies. They need legitimization by law or ordinance, contract or agreement or just by the decision of an authorized and recognized board. In contrast to e-business, in the 32 European cases, almost all semantic and organizational IOP standards for nationwide services have been established by law or ordinance, while on the regional level contracts or agreements were most frequent (cf. Table 5).

	Mandatory (Obligation)	Voluntary (Recommendation)
Law, Ordinance	e.g. use of the X-Meld standard in Civil Registration in Germany	e.g. standards for e-invoicing in Finland
Agreement, contract	e.g. use of EDIAKT II in the standardized e-form exchange in Austria	e.g. OIO-XML standards in Denmark

Table 5. Legitimacy and Authorization

In a third phase, standards, which have been recommended or made mandatory, still have to be implemented and put into operation by assigning certain tasks to certain organizations or units. They can be public or private or public-private partnerships. In many cases tasks of control or supervision are assigned to boards or committees, in particular for promotion, diffusion, maintenance and updates of the respective standards, while tasks of operation are assigned to governmental agencies, joint or supervision are assigned to boards or committees, in particular for promotion, diffusion, maintenance and updates of the respective standards, while tasks of operation are assigned to governmental agencies, joint ventures or private enterprises as service providers (cf. Table 6).

	Public	Private	PPP
Maintenance	e.g. KoopA ADV for the X-Meld standard in Germany		e.g. e-invoice consortium in Finland
Operation	e.g. KoopA ADV for the X-Meld standard in Germany	e.g. e-invoice service providers in Finland	

Table 6. Maintenance and Operation

Organizing for Interoperability ("What" and "How")

In contrast to the governance of IOP, providing interoperation directly concerns the technical and functional concepts and implementations.

As mentioned above, the way interoperation is provided and maintained follows different lines and should be considered as a separate aspect. If we conceive the provision of interoperation as a coordination problem organization theory offers two main strategies: centralization or standardization.

Organizations or networks of organizations may achieve coordination of tasks or processes either by giving authority to one unit, i.e. centralization, or by agreeing on standards, which all decentralized units have to apply.

Following this distinction, the next question is whether these two dimensions can be differentiated further in order to show different options within each of these dimensions. One idea is to look for what is standardized and what is centralized in interorganizational data exchange networks.

After analyzing the cases collected in the MODINIS study (see http://www.egov-iop.ifib.de for the individual case studies), the following distinction is proposed.

In order to achieve fully interoperable data exchange across governmental units, there is a need for:

- Standardized directories (same directory is available in each involved unit) providing the address data for routing.

- Standardized data exchange formats on the syntactic layer.

- Standardized data keys or ontologies on the semantic layer.

- Common workflow definitions to describe the source and target processes of the exchange.

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

- The routing of messages via a central directory.

- The conversion of data exchange formats if there are more than one.

- Providing access to files of selected (master) data.

- Maintenance of directory data.

- Workflow control (e.g. process control, validation, quality control, tracking and tracing).

It is obvious that in all cases, messages are exchanged between different organizations and that some kind of routing is necessary based on directories to find and determine the target address. Instead of each participating organization individually maintaining such a directory, it is much more efficient to have one central provider who maintains and updates this directory. In order to exchange data between automated processes, there is also a need to define the source and target workflow as well as data exchange formats. Examples are applications for social benefits, notice of change of address, or invoices. In some cases, standardization covers the syntax of the messages, e.g. XML schemes for an order, in other cases the meaning of certain data fields is standardized as well, e.g. a unique citizen or business number in an application form or a unique article number in an order or invoice.

Again a central unit may maintain a database with this kind of reference data more effectively. And if there are several formats, it may provide a conversion service as well.

Reflecting the Usefulness of the Operationalization

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

From a scientific or analytical point of view, there is the question whether this classification allows for identifying certain patterns and relations. One question in this regard is whether there is an order of the various kinds of action on each of the two sub-dimensions of interoperation (centralization and standardization). Do they have a cumulative structure, i.e. is there a rank order according to which a measure ranked higher only appears where all the measures ranked lower exist as well?

The analysis of these relationships between different measures and the search for patterns as well as the examination of the different governance aspects is subject to an ongoing research process, which has started in May 2008. Hopefully in the presentation on the conference some further findings will be presented and discussed. In any case we would like to discuss the concept of the three organizational dimensions of interoperability and the suggested operationalization with the expert community either to receive support for building the analysis of these propositions or to get suggestions for changes in order to better meet the information needs of those working on interoperability and to whom the interoperability frameworks should provide guidance and support.

REFERENCES

[1] Bousson, A., and A. Keravel, Political, Organizational and Economic Effects in Networked Public Organizations: Organizational Case Studies. TERREGOV Project IST 507749. Deliverable D 6.8, 31.12.2005. Available at http://www.egovinterop.net.

[2] CEC, European Commission, Communication from the Commission to the Council and the European Parliament COM 45 - Interoperability for Pan-European eGovernment Services, 2006. Available at: http://europa.eu.int/idabc/servlets/Doc?id=24117.

[3] CEC, European Commission, Directorate General for Information Society and Media. Online Availability of Public Services: How Is Europe Progressing? Web-Based Survey on Electronic Public Services. Report of the 6th Measurement. June 2006. Available at: http://ec.europa.eu/idabc/servlets/Doc?id=25150.

[4] CEC, European Commission, Directorate General for Information Society and Media. Online Availability of Public Services: The User Challenge Benchmarking. The Supply Of Online Public Services. Report of the 7th Measurement. September 2007. Available at http://www.epractice.eu/document/3929.

[5] EPAN, European Public Administration Network, eGovernment Working Group: Key Principles of an Interoperability Architecture. Brussels 2004. Available at http://www.epractice.eu/document/2963.

[6] ETSI - European Telecommunications Standards Institute - (2006): Achieving Technical Interoperability – the ETSI Approach. ETSI White Paper No. 3. By Hans van der Veer (Lucent Technologies) and Anthony Wiles (ETSI), October 2006.

[7] European Communities, Draft document as basis for EIF 2.0, 2008. Available at http://ec.europa.eu/idabc/en/document/7728.

[8] IDABC, European Interoperability Framework for Pan-European e-Government Services (EIF) Version 1.0. European Communities, Luxemburg, 2004.

[9] Kieser, A. and H. Kubicek, Organisation. 3rd edition, Berlin, New York, De Gruyter 1993.

[10] Kubicek, H., Millard, J. and H. Westholm, Back-Office Integration for Online Services between Organizations, in Anttiroiko, A.-V. and M. Malkia (eds.), Encyclopedia of Digital Government. Vol. I, 2007, Hershey IDEA Group, pp. 123 - 130.

[11] Kubicek, H., and P. Seeger., The Negotiation of Data Standards. A Comparative Analysis of EAN and EFT/POS Systems, in Dierkes, M. and U. Hoffmann (eds.), Technology at the Outset. Social Forces in the Shaping of Technological Innovations, Frankfurt, New York, Campus 1992, pp. 351-374.

[12] Kubicek, H., The Organizational Gap in Interbranch EDI Systems, EDI Europe, Vol. 33 1993 No. 2, pp. 105 – 124.

[13] Kubicek, H., and R. Cimander, Interoperability in eGovernment – A Survey on Information Needs of Different EU Stakeholders, European Review of Political Technologies (ERPT), Vol. 3 2005, pp. 59-74.

[14] March, J. G. and H. A. Simon, Organizations, John Wiley, 1958.

[15] Millard, J., Iversen, J. S., Kubicek, H., Westholm, H. and R. Cimander, Reorganization of Government Back-Offices for Better Electronic Public Services – European Good Practices (Back-Office Reorganization). Final Report to the European Commission, Institute for Information Management Bremen GmbH and Danish Technological Institute, 2004. Available at http://www.epractice.eu/document/3187.

[16] Peristeras, V., and K. Tarabanis, The Connection, Communication, Consolidation, Collaboration Interoperability Framework (C4IF) for Information Systems Interoperability, International Journal of Interoperability in Business Information Systems (IBIS), Vol. 1 2006, No. 1, pp. 61-72.

[17] Schmidt, K.-U., Henckel, L., Holzmann-Kaiser, U., Tschichholz, M. and O. Fox, Document Interoperability for Use in eGovernment Sharing of Information Stored in Documents with Back-Office eGovernment Applications. Fraunhofer FOKUS, 2005.

[18] Scholl, H. J., and R. Klischewski, E-Government Integration and Interoperability: Framing the Research Agenda. International Journal of Public Administration, (IJPA), Vol. 30, No. 8-9, 2007, pp. 889 – 920.

[19] Tambouris E., Tarabanis, K., Peristeras, V. and N. Liotas, Study on Interoperability at Local and Regional Level. Prepared for the eGovernment Unit, DG Information Society and Media, European Commission, Feb. 2007. Available at: http://www.epractice.eu/document/3652.

The Computing Technology Industry Association, Inc., European Interoperability Framework – ICT Industry Recommendations. White Paper. Brussels, 18. February 2004. Available at: http://www.comptia.org/issues/docs/interopwhitepaper0204.pdf

The National Interoperability Framework: a New Regulatory Tool to Guarantee Interoperability Among Spanish Public Administrations

Agustí Cerrillo
Universitat Oberta de Catalunya
Barcelona, Spain
acerrillo@uoc.edu

ABSTRACT

In this paper we describe the Spanish regulation of the National Interoperability Framework which is a new interoperability mechanism in Spanish Public Administrations (State, regions and municipalities) foreseen in the recently passed *Act 11/2007*, 22nd June, on electronic access of citizens to public services.

KEYWORDS

Interoperability, National Interoperability Framework, Spain

INTRODUCTION

Relationship among Public Administrations in e-Government is one of the main motors to promote its development. As it has been stated by the European Commission "failure to put in place interoperable eGovernment systems will have both economic and social costs.

These include: static unresponsive public administrations that are expensive to run and incapable of implementing policy promptly; inability to develop value added eGovernment services; higher costs, greater administrative burden and competitive disadvantage relative to local firms (e.g. inability to participate in public e-procurement activities), and hampering the proper functioning of the Internal Market" (European Commission, 2003).

Afterwards, the European Commission in its Communication on Interoperability for Pan-European eGovernment Services states that "interoperability is a prerequisite for the delivery of eGovernment services across national and organisational boundaries" (European Commission, 2006).

Different mechanisms have already been used in Spain through which Public Administrations establish and canalize their relations to increase the interchange of data, to facilitate the transaction in administrative procedures and to improve the benefits of the use of electronic means in Public Administrations.

However, the lack of a specific regulation of the relations among Public Administrations regarding the development of e-government, a part from general law principles applied to the relations among Spanish Public Administrations (i.e., transparency, coordination or cooperation), has limited the advance of interoperability in Spain.

That is why, as stated later, the regulation of interoperability mechanisms by *Act 11/2007*, 22nd June, on electronic access of citizens to public services will facilitate the advance in the cooperation and the interoperability of Spanish Public Administrations.

REGULATION OF INTEROPERABILITY IN SPAIN

Nevertheless, the regulation of different mechanisms of cooperation and interoperability may not be sufficient by itself. E-government has a polyhedral character. For that reason, to progress in the relations among Public Administrations in e-government it is necessary to establish technical criteria shared by different Public Administrations that allow the interconnection and interchange of data among them, to count on political leadership that impels the organizational changes necessary to approach this interrelation, and also, to regulate different mechanisms through which advance in the interadministrative cooperation in e-government.

The importance of the regulation of interoperability has not generally been emphasised. In a country like Spain with an administrative law tradition, regulation has an important role to improve interoperability.[18]

That is the reason why, on the one hand, a lack of regulation can be an obstacle to interoperability. In this sense, we can take into account the Interoperability Declaration of Valencia when it states as a priority that "Member States, regions or local administrations, according to the different distribution of competencies legally established in each Member State, should incorporate to their own legislation, at an imperative level, the rules, standards, recommendations and instructions related to interoperability that integrate the European Interoperability Framework and the other ones that the European Interoperability Agency could determinate" (ESIIG, 2006). But, on the other hand, excessive regulation can become a brake to the development of interoperability and in general e-government.

Interoperability in Spain has not been specifically regulated until the approval of *Act 11/2007*. However, in the last years different mechanisms have been settled down to allow interoperability between e-government applications developed by Spanish Public Administrations.

In the Spanish Public Administration (state level) the main initiative in the field of interoperability is found in the *Criteria of security, normalization and conservation of the applications used for the exercise of powers*.[19]

NOTES

[18] As it was pointed in the report Breaking barriers to e-government, a regulation that promotes open standards, technologies or platforms can become an important mean to improve interoperability" (OII, 2007).

[19] The Criteria of security, normalization and conservation of the applications used for the exercise of powers has been for a long time the only interoperability mechanism in the Spanish Public Administration at ths state level. The Criteria were prepared by Consejo Superior de Informática y para el impulso de la Administración Electrónica (CSI) and they were passed by Comisión Interministerial de Adquisición de Bienes y Servicios Informáticos, in June, 24th, 2004.

The Criteria of security, normalization and conservation have three main purposes:

- To facilitate the adoption by Spanish Public Administration of organizational and technical measures that assure authenticity, confidentiality, integrity, availability and conservation of information and data in the applications used by it in the exercise of powers.

- To provide a set of organizational and technical measures of security, normalization and conservation that guarantee the fulfillment of the legal requirements for the validity and effectiveness of administrative procedures of Spanish Public Administration, which use electronic means in the exercise of its powers.

- To promote the maximum use of information and communication technologies in the administrative activity, making sure the protection of citizens' information in their relations with Public Administration.

Criteria of security, normalization and conservation are based in a set of technical rules widely accepted that pursue guarantee interoperability among public bodies in the Spanish Public Administration.

These Criteria are structured in three volumes: security criteria, normalization criteria and conservation criteria.
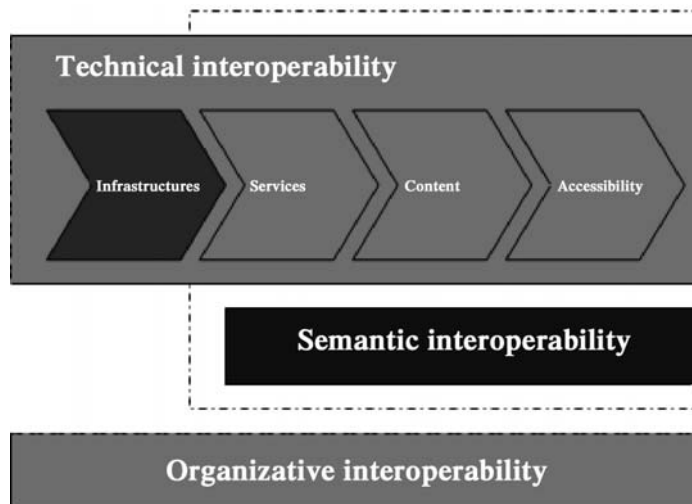
Figure 1. Interoperability levels included in the Criteria of security, normalization and conservation

In addition to Criteria of security, normalization and conservation some collaboration agreements have been signed to move forward interconnection among State Public Administration and regional and local ones.[20]

NOTES

[20] As an example it can be cited the Collaboration Agreement among Federación Española de Municipios y Provincias, Asociación Española de Banca, Confederación de Cajas de Ahorros, Unión Nacional de Cooperativas de Crédito and Red.es to spread and implement the use of electronic payment service in municipalities.

In the regional and local level, interoperability has been regulated by different instruments. As an example, in Catalonia interoperability has been a public goal of different Public Administrations (not only in the regional level, but also in the local one) during the last few years.

In particular, in 2002 Generalitat de Catalunya and municipalities (through Consortium Localret (Consortium for the implementation of telecommunication network and new technologies) created Catalan Consortium for Open Administration (Consorci Administració Oberta de Catalunya- Consorci AOC).

Many of Catalan Public Administrations also signed an agreement in 2006 to promote and develop interoperability among Catalonian Public Administrations information systems.[21]

However, as it has been stated, the main change in the regulation of interoperability mechanisms in Spain will be in the application of *Act 11/2007*. *Act 11/2007* foresees cooperation in the electronic means used by the public Administrations as general principle[22].

This principle intends "to guarantee both the interoperability of the systems and the solutions adopted by each of them and the services given to the citizens (…) In particular, the mutual recognition of electronic documents and means of identification and authentication arranged in the present Law will be guaranteed".

From a general point of view, the development of interoperability supposes a precision of the principles of coordination and interadministrative cooperation.

In particular, interoperability is defined in *Act 11/2007* as "the capacity of information systems, and therefore the procurements based on them, to share data and to make possible information and knowledge interchange among them".

As it is widely known, Spain is a decentralized State where political and administrative powers are distributed among the State, regions and municipalities. In relation with this, the priorities fixed by Interoperability Declaration of Valencia should be reminded.

In particular, when it is stated that "the public administrations, specially the regional and national ones, should specifically incorporate within their plans or programs on Information and Communication Technologies and the Knowledge Society, strategic action lines on the subject of interoperability" (ESIIG, 2006).

The collaboration and the interadministrative cooperation in e-government take shape through different instruments. Interoperability implies the use of different cooperation mechanisms: the creation of public bodies to coordinate Public Administrations (Sectorial Commission of e-government), procedures and agreements. *Act 11/2007* makes reference to all these mechanisms.

NOTES

[21] Conveni marc de col·laboració entre el Departament de Governació i Administracions Públiques, en nom de l'administració de la Generalitat de Catalunya, el Consorci Localret, l'Ajuntament de Barcelona i el Consorci Administració Oberta Electrònica de Catalunya per a l'impuls i el desenvolupament de la interoperabilitat dels sistemes d'informació de les administracions catalanes. Available in: http://www.aoc.cat/index.php/ezwebin_site/content/view/full/446 (last visit: 21/07/2008). Further information about the Catalan Interoperability Model in (Albors, Carabante, 2007)

[22] Article 4.e) Act 11/2007.

Chapter II of Title IV *Act 11/2007* regulates the hard core of the system of interoperability among Spanish Public Administrations. In particular, it defines the interoperability principle and it foresees the passing of the National Interoperability Framework. In addition, it regulates different infrastructures for the interoperability like the Communication network of the Spanish Public Administrations (SARA Network)[23] and the Integrated Network of Attention to the Citizen (Red 060).[24]

As starting point, article 41 *Act 11/2007* foresees that the relations of the Public Administrations among them and with citizens will be made by electronic means when they have a suitable level of technical, semantic and organizational interoperability and avoid any discrimination to the citizens for reason of their technological election. That is why technological, organizational and security measures that are necessary should be applied.

This way, interoperability as a principle that must govern the relations of the public administrations among them and with the citizens is added. This interoperability must be applied in the three areas already mentioned (technician, organizational and semantic) and must be implanted through measures of different order necessary to guarantee this principle.

THE NATIONAL INTEROPERABILITY FRAMEWORK

The principles alluded before must guide the development of the Spanish policy of interoperability that will be settled in the National Interoperability Framework as other European State members did impelled by the European Union, when articulating their interoperability policies through the adoption of interoperability frameworks or schemes. As it has been defined by the European Interoperability Framework, an interoperability framework is a "set of standards and guidelines that describes the way in which organisations have agreed, or should agree, to interact with each other" (IDABC, 2004).

In agreement with it, *Act 11/2007*, 22 June, electronic access of citizens to public services, foresees that the National Interoperability Framework will include a set of criteria and recommendations in the field of security, conservation and normalization of data, formats and applications.

Spanish Public Administrations (state, regions and local government) should take all these criteria and recommendations into account when making technological decisions that guarantee interoperability.

The National Interoperability Framework must be sufficiently detailed to allow the effective interoperability between Public Administrations, but it must as well be flexible enough to allow different Public Administrations to develop an own model of e-Government. Otherwise, the development of this mechanism of cooperation can have a negative impact on the autonomy of Autonomous Communities and Local Government.

NOTES
[23] http://www.csi.map.es/csi/pg5r12.htm
[24] http://www.060.es/

The National Interoperability Framework intends to give the rules that must be respected by the information systems developed, to the people in charge of the projects and applications of e-government. In fact everything aims at that, in spite of their technical character, the criteria and recommendations incorporated in the National Interoperability Framework must be respected by all Public Administrations in the development of their projects of eGovernment.

The writing of the rule that is analyzed ('should be taken into account by Public administrations') seems to confirm this opinion. This follows the same line as in France and United Kingdom where the Réferentiel Général d´Interoperabilité (RGI) or the e-Government Interoperability Framework (e-GIF) foresee that Public Administration have to follow their standards and policies. Whereas, it is different to the German regulation (Standards and Architectures for e-government applications -SAGA) which states that Public Administrations can follow what it is stated in the National Interoperability Framework.

It is also possible to decide if the procedure and act to pass the National Interoperability Framework and the act must be considered. Anyway, the fact that the law foresees that the National Interoperability Framework includes "the set of criteria and recommendations" seems to limit the reach of its normative character (Guijarro, 2007). *Act 11/2007* foresees a procedure for the adoption and passing of the National Interoperability Framework that aims to integrate the opinions of the different public administrations affected. Thus, in particular, article 42.3 establishes that it will be passed by the Spanish Government, through a Royal Decree, after being proposed by the Sectorial Conference of Public Administration and with the previous report of the National Commission of Local Administration.[25]

The establishment of this complex procedure that intends to integrate the different territorial levels in the elaboration of the National Interoperability Framework is significantly important considering its importance in the development of the e-government at a state, regional and local level. Anyway, we should also notice that the leadership of the process of elaboration of the National Interoperability Framework, as well as its definitive passing, corresponds to the Spanish Public Administration, which should take a sensitive attitude towards regional and local points of view.

As it has been defined by the European Interoperability Framework, an interoperability framework "is not a static document and may have to be adapted over time as technologies, standards and administrative requirements change" (IDABC, 2004).

Act 11/2007 is conscious of the dynamic character of the regulation of interoperability. For that reason, it anticipates that the National Interoperability Framework should be permanently updated. In spite of the dynamic character of the National Interoperability Framework, *Act 11/2007* does not establish any mechanism for its revision and periodic update. Neither does it anticipate any mechanism to check its fulfillment as it is done in the United Kingdom where mechanism of acceptance and implementation have been established.[26]

NOTES

[25] National Commission of Local Authorities (Comisión Nacional de Administración Local) is a permanent public body to canalize collaboration among State and local authorities which includes representatives from the State and Spanish municipalities in the same proportion. It has been regulated by articles 117-119 Local Regime Law passed in April, 2nd, 1985 and Royal Decree 427/2005, April, 15th.

[26] e-GIF Compliance Assessment Service, accessible in http://www.egifcompliance.org/ and e-GIF Accreditation Authority, accessible in http://www.egifaccreditation.org/ (last visit: 18/09/2007).

Perhaps a regulation of these aspects corresponds rather to a norm of prescribed character that to the own *Act 11/2007*. Nevertheless, *Act 11/2007* could have mentioned the application of the National Interoperability Framework which would have reinforced its normative character.

Regarding the specific content of the National Interoperability Framework, *Act 11/2007* gives nothing more than some directions or recommendations that must be taken into account. Thus, in particular, it is expected that in the elaboration of the National Interoperability Framework the recommendations of the European Union will be considered. Also, *Act 11/2007* expects that the existing electronic services will also be taken into account.

Finally, *Act 11/2007* establishes that the National Interoperability Framework must consider the use of open standards. So, as it has been pointed in the previous pages, this aspect is crucial to assure the advance of interoperability. Nevertheless, it must be observed how *Act 11/2007* by open standards has not been total when considering, of complementary way, the possibility of resorting to the standards that are of use generalized by the citizens.

CONCLUDING REMARKS

National Interoperability Framework is widespread mechanism to promote interoperability in e-government. In Spain there is no previous experience in the adoption of an interoperability framework further than Criteria of security, normalization and conservation of the applications used for the exercise of powers.

Act 11/2007 foresees the adoption of a Spanish National Interoperability Framework. The rules, standards and recommendations included in the Spanish National Interoperability Framework must be respected by all Public Administrations (State, regions and municipalities).

The adoption of a National Interoperability Framework can promote that interoperability will be easier reached among Spanish Public Administrations. However, a detailed framework can restrict autonomy both from regions and municipalities. That is the reason why the procedure followed to pass the National Interoperability Framework acquire an special importance in order to guarantee the participation of all affected Public Administrations.

REFERENCES

Albors, I.; Carabante, S., The Catalan Interoperability Model. eGovernment Interoperability Campus. 2007. 10 & 11 October 2007 - Paris (France). Available at <http://www.egovinterop.net/Res/10/Albors%20paper.pdf> Last visit: 21/07/2008 (2007).

European Commission, Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions about "The Role of eGovernment for Europe's Future", September, 26ht, 2003 [COM(2003) 567 final] (2003).

European Commission, Communication From The Commission to the Council and the European Parliament Interoperability for Pan-European eGovernment Services, February, 13th, 2006 [COM(2006) 45 final], (2006).

Guijarro, L., Interoperablity frameworks and enterprise architectures in e-government initiatives in Europe and the United States", Government Information Quarterly, núm.24 (2007).

IDABC, European Interoperability Framework for Pan-european eGovernment Services (ver. 1), available at: <http://ec.europa.eu/idabc/servlets/Doc?id=19528> (last visit: 18/09/2007) (2004).

Interoperability Declaration of Valencia, I European Summit on Interoperability in the iGovernment, Valencia, November, 22-24th, 2006.

Oxford Internet Institute, Breaking barriers to E-Government. Overcoming Obstacles to Improving European Public Services. Online survey of barriers to E-Government, available at: <http://www.egovbarriers.org/?view=survey >(last visit: 18/09/2007).

The Realization of the Greek E-Gif

Andreas Papadakis
Greek Ministry of Interior
Athens, Attica, Greece
a.papadakis@yap.gov.gr

Kostas Rantos
Greek Ministry of Interior
Athens, Attica, Greece
k.ran@yap.gov.gr

Antonis Stasis
Greek Ministry of Interior
Athens, Attica, Greece
a.stasis@ypesdda.gov.gr

ABSTRACT

The design and delivery of interoperable e-services has proven essential for the modernization of e-governance. In this context, the establishment of a common framework which sets the basis for implementing e-government services is fundamental. In this paper we present an outline of the Greek e-Government Interoperability Framework and the lessons learned so far in the context of implementing it for the purposes of the Greek portal of the public administration, called Hermes.

KEYWORDS

Interoperability framework, one-stop-gov, electronic certificates, e-signatures.

INTRODUCTION

The provision of e-government services typically involves numerous of government information systems, most of which are closed and developed fulfilling specific vertical requirements, without considering the needs for communication and exchange information with other government systems. The first attempts of exchanging information among different government bodies electronically highlighted the erroneous approach that had been taken in the past.

The situation worsens when there are intentions to provide one-stop services where the exchange of information among the participating systems has to be done in a well-established uniform manner among all participating entities, which typically comprise all government bodies.

As a result the provision of one-stop services requires reconsidering the way systems are implemented and services are provided.

To achieve the aforementioned desired result most governments have proceeded in defining rules by which systems provide services and interact, and which have the form of e-government frameworks.

These typically come to contribute to the normalization of the complexity and diversity of the established procedures and their corresponding implementations.

In this paper we present an outline of the Greek e-GIF as well as the experience gained from its realization in the implementation of the national e-government portal, called HERMES.

GREEK E-GIF

The Greek e-Government Interoperability Framework is comprised of three distinct standards regarding the implementation and delivery of e-government services as well as a common interoperability registry complemented by a validation model necessary for verifying the compatibility of deployed e-services with the specified framework.

Figure 1. Greek e-Gif outline

Certification Framework for Public Administration Sites and Portals

This framework specifies the directions and standards to be followed by the public agencies at central or local level, when designing, developing and deploying e-government portals of the Public Administration and supporting e-government services.

Among the issues that this framework deals with are URLs format, content structure and presentation, navigation, content searching, accessibility, e-services, provision, authentication, and private data protection.

The aim is to eliminate the heterogeneity of all government sites and to establish a uniform way of organizing, presenting, and providing the content and e-services.

Interoperability and Electronic Services Provisioning Framework

It defines the basic principles and the general strategy to be followed by the public agencies, when developing e-government Information Systems and services.

These frameworks provide guidelines, specifications and standards that should be used for the communication and the efficient exchange of information between e-government systems, aiming to the provision of integrated and interoperable e-government services. Three dimensions have been identified:

- *Organizational interoperability*, focusing on the management and improvement of services, identifying common service characteristics and homogenizing the service provision. The challenge is that the roles and the responsibilities, in many service provision scenarios, are not completely clear or they are overlaid; in some cases even the rules (service logic), based on a complex legislative framework, have to be further clarified. The formal description of services has been a prerequisite for the identification of the joint – collaboration points among different legal entities, where delays are identified, and afterwards the process alignment and improvement. Business Process Modelling Notation, (BPMN) has been adopted for the formal description of the service that will be developed in the future. Existing services can also be described using UML.

- *Semantic interoperability*, focusing on the development of common semantic models. The challenge is that during the vertical computerization efforts, each legal entity defined its own data model; data reusability, among different legal entities, has been, until recently, practically not achieved – at least in an automatic manner. In the rare cases where data has been exchanged among different entities, ad hoc solutions have been followed. The effort has focused on the involvement of the competent authorities, in the public sector, in order to create a shared vocabulary including data elements, core components and codelists and ultimately XML schemas. Greece is implementing a centralized model through the Hermes project, where a set of core elements can be defined in a centralized manner and special sets of vertical models can also be created and maintained by the competent authorities.

- Technical specifications, focusing on the best practices for the specification and implementation of Information Systems and services. Multi-tier and service - oriented architectures based on component are encouraged. As already mentioned, one of the most challenging issues has to do, not with the standalone application, dealing with "local" data (i.e. data owned by the competent authority), but with composite services. Such services have to re-use the components of other services, provided by different authorities. Rigid technical guidelines (focusing on SOAP-based web services) are provided in order to enable such a fine-grained collaboration. While the adherence to such guidelines is relatively easy for new systems, it is more complex in the case of existing, legacy systems, where the need for a wrapper is usually foreseen as a temporary solution.

The concept of e-government services plays an important role, in this part. The well known 5-level categorization is followed and the user (citizen / business) requirements are examined in detail.

The services scope includes Government to Citizens (G2C), Government to Business (G2B) and Government to Government (G2G) services.

133

Digital Authentication Framework

It provides the guidelines for identification and authentication of users utilizing e-government services and sets the rules regarding issuance and usage of public key certificates for the electronic services authentication and digital signatures.

The framework follows an approach where services are categorized based on the type of data being handled by the applications and the need for assurances regarding the collected evidence on user's participation. As such, the authentication methods approved for e-government services can be one of the following.

• Username and password.

• Soft Digital Certificates, i.e. certificates stored on user's PC.

• Digital Certificates stored on secure signature creation device (providing strong authentication and qualified electronic signatures).

Validation Model for Public Administration Processes and Data

The validation model is a practical guide which defines the notation, the rules and the specifications for the design, implementation and documentation of the Public Administration processes, documents and electronic data exchange messages.

Interoperability Registry

In the context of the development of the Greek e-GIF, the Greek Interoperability Registry has been designed. A set of governmental services have been analyzed and modeled in the context of various projects that have been implemented under the 3rd Community Support Framework.

Finally a national Interoperability Registry is being implemented in the context of the Hermes Project. This will be a web-based repository of service and document metadata, services process models, standardized XML schemas for mostly used governmental documents based on UN/CEFACT/CCTS standards, as well as codelists for the most common information elements within governmental service provision in Greece.

GREEK NATIONAL GOVERNMENT PORTAL – HERMES

Hermes is the Greek national Governmental Portal for the Provision of Information and Secure e-Transactions to Citizens and Businesses.

The aim of Hermes is to become the electronic single point of contact (one-stop shop) for government services. Hermes will also host the Greek e-gif Interoperability Registry and the consultation and deliberation mechanism for the evolvement of the Greek e-gif. Hermes is based on three axis.

- Content Provision.

- Interoperability of services.

- Authentication of citizens and businesses.

Content Provision

Hermes aims to serve as the electronic single point for the provision of government information. As such, the content of the portal has to be complete, accurate, consistent, and up to date so as to be a reliable and lawful source for all interested parties. Care should be taken on the following issues regarding content management:

- **Creation**. Not all of the content included in the portal is original. Recreating the original content that is already available on other sites is not an efficient approach. Still though the collected content has to be checked for its completeness and in some cases complemented.

- **Exchange (primarily provision)**.

- **Processing and homogenization**.

- **Characterization (based on metadata)**.

- **Syndication and management**.

- **Delivery**. It should provide multi-access capabilities based on the subject (life episodes and fine-grained thematic categories) by different groups (business, citizens and special groups e.g. students, pensioners etc.)

Initially it has been verified that more than 250 authorities can provide content that can be of interest to the users of Hermes. These authorities have been categorized based on the following criteria:

- The Content volume.

- The publics that are served by these authorities; niche publics are not excluded, but they are characterized as low priority publics.

- The frequency of content updating.

According to these criteria three groups of authorities have been identified:

- Crucial public administration authorities, the content of which is very important for Hermes.

- Important public administration authorities, the content of which is relatively important.

- Indifferent public administration authorities; the content is less important.

135

Of course it is recognized that the level of an authority can change during over time and it is important to monitor the performance of the authorities based on these criteria.

The overall effort is enhanced by the measurements of the public interest as occurring by the Management Information System of the Citizen Service Centers (KEP), which provides insight on the public interest in a dynamic fashion.

In parallel to selecting the preferred authorities, we have to deal with the important technical issue of content provision from multiple sources. Manual, semi-automated and automated (web services, RSS) ways have been explored.

- Content and metadata insertion on behalf of the third-party authorities, using forms.

- Retrieval of content and metadata on behalf of the Hermes system, invoking the web services provided by the authorities.

- Provision of content and metadata on behalf of the authorities invoking the web services provided by the authorities.

Hermes has thematically organized all service and content areas. This organization is based on three criteria:

- The Government Category List (GCL).

- The users.

- The government authorities.

This way a set of metadata has been created that support the – to a certain degree – automatic categorization of new content. All ways of content provisioning (from the manual to the automated) enforce the usage of metadata. All tasks are supported by a well defined workflow engine.

Authentication of Citizens and Businesses

The unambiguous identification and authentication of a participating entity is the starting point in providing access to e-services. Hermes, in line with the Digital Authentication Framework, deploys a number of different authentication methods to deal with the diversity of the corresponding e-services requirements, ranging from the traditional use of username-password to the strongest method of digital certificates combined with the use of smart cards.

Hermes has established a Certification Authority (CA), which has undertaken the task of issuing digital certificates to citizens and businesses for the purposes of authentication, digital signatures, and confidentiality.

This CA is part of the Greek Public Sector Public Key Infrastructure (signed by the Hellenic public administration root certification authority) which was established in the context of the SYZEFXIS project, the Greek Public Sector Network.

Not all government e-services however, are served by Hermes. The existing governmental sites continue to provide old as well as newly deployed services from their own sites.

E-GIF framework compatibility requires service providers to upgrade their authentication methods, if necessary, and be able to handle digital certificates. The latter is also necessary for the handling of digital signatures on electronic documents.

To promote interoperability of the certification services provided by Hermes CA and ensuring the wide acceptance of the issued certificates by all government bodies, several issues had to be considered originating mainly from the participating entities' needs.

The lack of a unique national ID for Greek citizens and the fact that most government departments identify citizens using sector IDs issued by them is just one of these issues.

The lack of unique national IDs and the restrictions imposed by the legal framework regarding private data protection had become the bottleneck at deploying digital certificates accepted by all government bodies. As a result, sector IDs had to be included in the certificate in an encrypted form and provided to authorised parties only under the user's consent.

Citizens or businesses that wish to make use of the provided e-services that require strong authentication have to obtain from Hermes CA three different digital certificates:

- **Certificate for Digital Signatures and Authentication**. This certificate, when issued with a smart card, can be used for qualified electronic signatures based on the EU Directive 1999/93/EC.

- **Certificate for Encryption**. This certificate is used for providing confidentiality on exchanged data and documents.

- **Special Purpose Digital Certificate**. This certificate is used for conveying sector ids in encrypted form. Is used only for the initial.

These three certificates are "bound" together by the use of a common, yet unique to each certificate holder "Certificate Administration Code".

The Hermes certification services are complemented by the issuance of certificates to all civil servants for the purposes of performing their duties in a secure manner.

More specifically, civil servants that communicate data and handle documents are issued with two digital certificates (one for qualified electronic signatures and authentication and one for encryption).

Interoperable Service Delivery and Services

In the context of the implementation of the Hermes portal, which is expected to provide e-gov services (G2C, G2B, G2G), we have faced real problems (not only technical) when trying to ensure interoperability (especially when interconnecting information systems from different agencies). As previously mentioned, the level of service computerization in Greece is a lower that the EU mean rate (approximately 68% in comparison with 74%

according to [2]). In practice as seen in figure 2, the front end is computerized to a significant degree, i.e. the citizens and business can invoke a set of services using the web forms of the KEP's portal; however the back office, i.e. the execution of the service itself as well as the delivery of the result are performed to a significant degree manually.
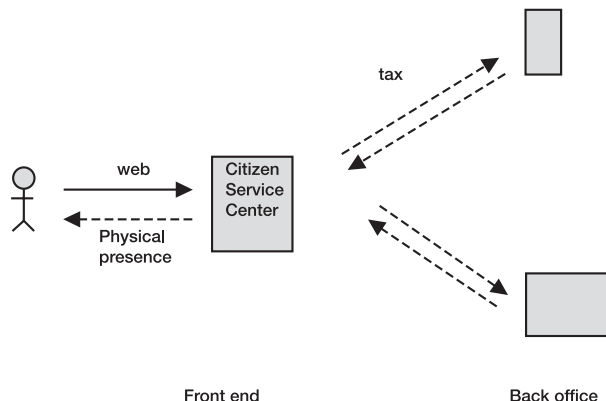
Figure 2. KEP's service model

Hermes is extending the computerization to the back office allowing the service execution to take place in a fully electronic fashion. As expected adaptation of the legislation framework and organizational changes is required.
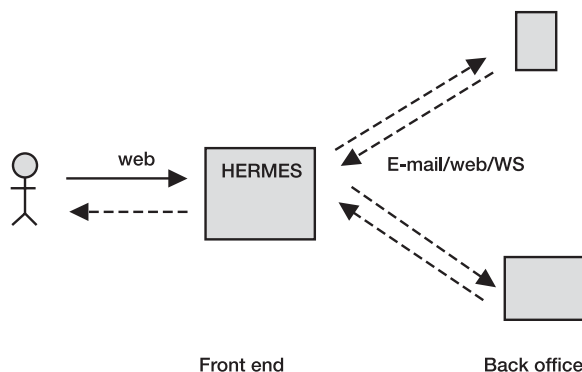
Figure 3. Hermes' Service model

The concept of the Citizen and Business Certification Registry (or "document safe" as it appears in other European implementations) was an idea that we have explored. Although it was expected to offer significant benefits for the integration and collaboration of the IS in the Public Sector we have met difficulties in terms of the legislation and objections coming from the Hellenic Data Protection Authority.

Non-repudiation is a significant issue in the content of service provision. For this purpose, a Time Stamping server is deployed, which is expected to play a significant role in the provision of e-gov services at both ends (inbound request coming from the citizen/business and outbound response returning to the citizen/business) and potentially in the individual steps (especially when different agencies are involved).

SERVICES

Hermes is in infancy therefore is not aiming to adopt and provide all the available government services at once. The harmonization with the e-GIF framework is a long lasting process.

A methodology has therefore been established for the evaluation and prioritization of services based on parameters including the significance considered by the EC, the frequency of the services usage by the public as well as more practical consideration such as the computerization level and the legal and organisational maturity of the involved governmental agencies.

The information on the service usage comes from one of the most significant MIS systems in Greece that of the Citizens Service Centres with millions of service request per year.

CONCLUSIONS

The development of the e-GIF is characterized as a win-win situation. It is expected to help public bodies overcome their introvert character, achieve a high level of homogenization, as regards the ergonomic and functional aspects of e-government portals, reduce bureaucracy and utilize reliable channels for the delivery of e-government services.

It also promotes the interoperability between Public Bodies on a legal, organisational, operational and technical aspect for the provision of integrated e-government services and it reduces the development cost of Public Administration Information Systems through the reuse of software components and the exploitation of existing e-governments services.

In the context of the end users, the benefits include the offering of high quality government services, the reduced expected service delivery time, the access to e-government services through multiple channels, the easier search and retrieval of information for e-government services and the enhancement of citizen trust by providing high level of quality, reliability, credibility, and transparency, when using e-government services.

The ICT companies are expected to benefit in the development of standards-compliant products, services and applications and the reuse of common codelists, vocabularies, process models and data schemas, resulting in better quality and lower cost products and services.

ACKNOWLEDGMENTS

REFERENCES

[1] Charalabidis Y., Lampathaki F., Askounis D., Stassis A., "Shifting to Second Generation E-Government Interoperability Frameworks", Proceedings of the International EGOV 2007 Conference, Regensburg (Germany), September 3-7, 2007

[2] Europa, e-government studies, http://ec.europa.eu/information_society/activities/egovernment/index_en.htm

[3] Greek e-Government Interoperability Framework "E-GIF"

[4] Specification and Development of the national portal "HERMES"

Build Government Interoperability Through Open Standard Technology

Goodwin Ting
Global Gov, Sun Microsystems Inc.
McLean, VA Virginia, USA
goodwin.ting@sun.com

Anne Rasanen
Global Gov, Sun Microsystems Inc.
McLean, VA Virginia, USA
anne.rasanen@sun.com

Marco Pappalardo
Marketing, Sun Microsystems Italy
Milano, Italy
marco.pappalardo@sun.com

ABSTRACT

In this paper, we describe the business drivers and challenges for government interoperability; identify key conditions needed to achieve true interoperability; demonstrate how select technologies enable interoperability while still preserving required distinctness; and provide several examples of both successful and unsuccessful implementations from around the world.

KEYWORDS

Policy harmonization, workflow, data exchange, identity management, open standards, federated identity, service-oriented architecture, open document format, multi-level security.

INTRODUCTION

The world is flat: people and businesses are connected and interwoven today in unprecedented ways and interacting at a pace unimaginable just a generation ago.

The restrictions and limitations of time, space, and borders have largely been eliminated in many sectors such as finance, transportation, and telecommunications.

A major contributor to the reduction of barriers in these sectors is the ability of disparate systems to interoperate with one another: an ATM card from Citibank will work in an ATM kiosk from Unicredit halfway around the world, seamlessly.

In the area of government services to its citizens and businesses, however, these physical and logical limitations still mostly exist. While many government organizations worldwide have indeed taken steps towards better interoperability, some have progressed further than others. The rest of this paper will review some key implementation challenges and technologies to enable government interoperability on a pervasive scale.

INTEROPERABILITY IN GOVERNMENT

Business Requirements

As the rest of the world have embraced and adopted business processes and technologies to enable 24x7 transactions, governments in Europe and elsewhere are struggling to keep up with the pace of change. Citizens and businesses are demanding that governments provide the level of services which they have now grown accustomed to with other industries.

Compare the relative ease and amount of effort needed to book travel reservations to far-away destinations, and get access to one's funds from a local ATM machine upon arrival – to the efforts required to pay one's taxes or get access to medical records while away from one's home region or country.

Along with this rise in demand for ubiquitous and streamlined government services, political and economic factors are also forcing governments to rethink how they interact and collaborate with each other. Within the European Union, transnational directions such as open borders, single currency, common defence framework, and other regulatory standardization initiatives all require enhanced interoperability in order to continue successfully and move to the next levels of efficiency and responsiveness.

With citizen and business consumers on one side, and policy directions on the other, the twin business drivers for improved public sector services have placed government interoperability squarely in the spotlight, and elevated interoperability requirements as a major challenge for government agencies, systems integrators, application developers, and technology vendors alike.

Evolution of Non-interoperability

Historically, government agencies and functions were designed, developed and have evolved to fulfill two primary functions: protection of group interests, and delivering service to its constituencies.

Protecting group interests may be at a city level, provincial level, or national level, and include such desired outcomes as:

142

- Sovereignty, including territorial defence and policy making.

- Economic stability and growth, including regulatory functions and compliance enforcement.

- Social stability and growth, including law enforcement, civil protections, and revenue collection and redistribution.

- Protection and retention of group assets, such as mineral rights, land, water sources.

Constituent services can also be at different governmental levels, and include key services for driving economic and social growth such as:

- Public education.

- Social benefits such as welfare, unemployment, retirement, and health care.

- Enabling services such as business licensing and motor vehicle registration.

- Quality of life services such as maintenance of parks, libraries, public venues.

The development and evolution of government organizations and operations to meet these two major core functions have typically taken mostly independent paths, fulfilling overall business objectives without detailed coordination between distinct and separate groups – interoperability was not a significant design objective. This process has resulted in silos of procedures, processes, data, and personnel. Consequently, government agencies are playing catch-up to meet the current operational requirements in an interlinked world as demanded by citizens and businesses, and dictated by policy directions. The stakes are often quite high – officials are elected and voted out of office based on their ability to deliver on these functions.

In the modern government environment, different agencies must maintain and deliver on their traditional core mission, while at the same time meet the more recent requirement to collaborate with other agencies towards a larger goal. This collaboration requirement spans multiple hierarchies and within each level:

- At the central government level within each country: the pensions administration needs to interact with the unemployment bureau with the income tax division.

- At the regional/local/municipal levels within each country: the local police force needs to interact with the local census bureau with the local fire district.

- Central and regional/local governments also need to interact with each other and collaborate on a wide range of functions.

- At the supranational level between EU member states to coordinate policies and operations on law enforcement, transportation, education accreditation, and a host of others services.

- Between the EU member states and the rest of the world for a wide variety of functions.

In addition to the organizational challenges and barriers to interoperability represented by these hierarchies and intra-level divisions, there are also policy and technological obstacles which need to be addressed to achieve effective interoperability.

Interoperability Challenges and Scenarios

Besides organizational and political considerations associated with government interoperability at a macro level, there are also several specific challenges which need to be addressed at the implementation stages.

These include: harmonized policies; workflow and services interoperability; data exchange and information sharing; cross-organizational identity and role management; and compatible security frameworks.

Harmonized Policies

In order to facilitate cross-agency (at any level) co-operation and collaboration, and to gain operational efficiency in providing services, government organizations must develop policies which can be harmonized with each other.

Unless it is a newly formed entity, organizations typically already have policies in place. When multiple organizations have to work together to jointly deliver a service, then those respective policies need to flexible and compatible enough so that all parties involved know how to accommodate each other to effectively achieve the common goal.

At a simplistic level, distinct policies from separate agencies can be cross-mapped or normalized to each other at specific intersecting points; at a comprehensive level, policies can be merged completely or even developed jointly.

A very typical example of policy harmonization is in the first responders community during times of emergency. Many nations maintain separation between the police force, emergency medical responders, and fire brigades. When a critical event occurs, these separate forces converge at the event site, and must coordinate both within their own forces as well as with each other to establish chains of command, plan the joint response, and coordinate on the execution of that response.

Policy harmonization ensures that the procedures, roles and responsibilities, actions, and outcomes of each individual organization efficiently contributes to the overall objective. Indeed, failure to harmonize policies in these situations can result in delays or ineffective responses resulting in significant loss of life and property: the 2005 Hurricane Katrina-caused flooding in New Orleans and subsequent breakdown in coordination between different emergency response agencies at the city, state, and federal levels is a tragic example.

While organizations which have a long history of working together – such as the first responder community – have developed and implemented harmonized policies to ensure interoperability, many other government organizations have yet to do so.

There are multiple reasons for this: newly-levied requirements to interact with other agencies; the emergence of ad hoc and non-persistent collaborative scenarios ("why take the time to harmonize if these events don't occur that often?"); and the simple fact that policy harmonization is often complicated, effort-consuming, and contentious.

Workflow and Services Interoperability

As governments respond to demands to streamline operations, increase service levels, and provide unified services, they are increasingly turning to technologies to digitize workflow and automate services. This trend towards e-Government service provisioning has forced agencies to examine how they operate, the roles and responsibilities of each participant in the process, and in some cases re-design legacy procedures to benefit from the transformation to e-Government.

In order to properly develop and automate workflows and services, policy level considerations must first have been addressed. Therefore, successfully implementing workflow and services interoperability requires that policies and policy harmonization aspects to interoperability are also in place.

Unlike policy harmonization which does not require technology to implement successfully, workflow and services interoperability occurs at the intersection of business processes and technological capabilities.

To implement government interoperability for workflows and services requires not just the business and operational level agreements between and within agencies, but also the selection of the appropriate technical tools, standards, and formats. The current state of maturity of the Internet and web services technologies ensure that the end user has plenty of choices in products and suppliers to meet the desired business objectives.

An common application of workflow and services interoperability is in the area of e-Customs. Many entities (both governmental and commercial) and transactions are involved in the process to receive goods at a port of entry for import into a country.

Properly designed and well implemented workflow and e-services offer great benefits to all parties concerned: faster payments for goods; real-time revenue collection for the customs agency; reduced dock time for shippers; shortened product delivery times for businesses and consumers; increased accuracy in goods declarations and import compliance; and improved border security. Similarly, interoperability failures in the workflow and services anywhere along the process chain results in delays and lost revenues and even possibly spoiled goods.

One successful example of workflow and services interoperability is the Singapore Tradenet e-Customs solution developed by Crimson Logic and implemented at the Port of Singapore to facilitate customs clearance and other functions. This system automates a variety of workflows and data exchange and provides interoperability between government and commerical organizations at one of the world's largest port facilities.

Data Exchange and Information Sharing

Information and data are at the heart of any government service: citizen records, economic data, business licenses, GIS information, records of past transactions – terabytes of information which are generated, collected, sorted and used daily by dozens of agencies to carry out their functions. Without the right data, streamlined and interoperable government services are meaningless.

Even within a government organization, the management of information and data is a major challenge: are the data accurate and current? Is any necessary piece of information missing? Who has the ability to view the information? Who has the authority to modify the data? How long should the data be kept? How does the organization ensure privacy and security around the information they have been entrusted with?

As in the case of workflow and service interoperability, policy harmonization is a mandatory precursor to successful data and information interoperability. Concurrently, technology and the selection of the proper data management tools, data formats, and interchange protocols are critical components to successful and effective government interoperability. Before the advent of the digital age, data interoperability and information sharing was relatively straighforward: text or diagrams on paper can be copied and distributed, and data repositories were physical filing systems.

Today's governments face data interoperability challenges created by technological advances: different types of databases; incompatible document formats; analog and digital formats for information; multimedia content; dynamically generated or non-persistent data; older formats which are no longer supported; and other effects too numerous to list.

Information sharing has also emerged as a key aspect of interoperability for governments. Agencies must share information to collaborate efficiently – taxes are based on incomes; pension eligibility and payments are based on recipient's age and prior income; educational investments may be based on census and other economic data. For each agency to independently collect and manage its own set of data translates to unnecessary duplication of efforts and high costs for government administration, as well as increased opportunity for errors and fraud.

A practical example of the utility of interoperable systems for data exchange and information sharing is the US income tax system. Most Americans typically pay income taxes to both the federal government as well as to their state tax agencies. The federal Internal Revenue Service (IRS) exchanges information with each state revenue agency to ensure proper tax payments or credits to each tax filer, and audits for fraud. The IRS also exchanges taxpayer information with other federal agencies such as the Social Security Administration and the Centers for Medicare & Medicaid Services to properly account for other government payments or deductions which affect the tax filer.

Cross-Organizational Identity and Role Management

Within government agencies and companies, organizational hierarchies and job functions of each employee are usually well-defined. There is a clear chain of command, and within the organization it is clear who to go to for functions such as procurement, spending approval, press releases, and many other business and operational decisions. For the citizen requiring a government service – especially at a traditional government office – it is also fairly clear who to turn to for what type of help. As government organizations move to a digital, e-government operational model, the distinctness of identities often becomes blurred within an agency. And as agencies increase collaboration with other agencies, the hierarchical structures and roles of individuals within each organization frequently do not dovetail clearly with each other.

Cross-organizational identity and role management is another major challenge for government interoperability, and is dependent on the successful harmonization of policies amongst agencies: who is authorized to do what under which conditions, and whose decisions take precedence over which others.

Once the policies are defined and in place, technology can be used to enable identity management and enforce roles assigned to those identities.

Harmonized policies; workflow and services interoperability; data exchange and information sharing; and cross-organizational identity and role management are four major challenges and parameters for enabling true government interoperability. Of the four, policy harmonization is the overarching parameter which the others depend on; if the policies are erroneous or incomplete, then the other aspects of interoperability will inevitably have flaws.
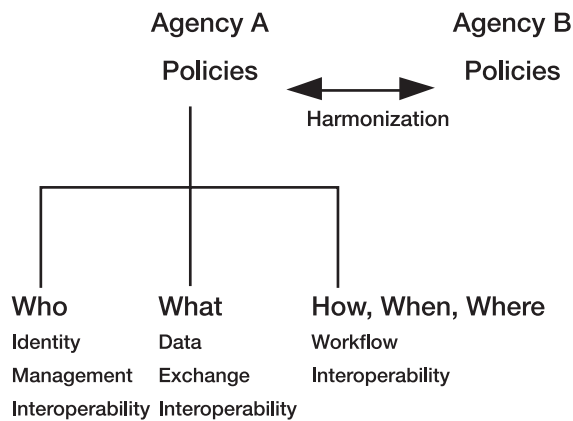
Figure 1 – Relationship of Interoperability Parameters

Figure 1 shows the relationship between the interoperability parameters - government services as delivered through efficient workflows (how, when, where the service is provided) by the appropriate people (who delivers the service) using the correct data (what information is needed).

Flying between Rome and Athens on any given day is a real-world example of governmental and organizational interoperability. Harmonized policies exist between the Italian and Greek air navigation service providers: ENAV and the Hellenic Civil Aviation Authority (HCAA), respectively.

Under the harmonized policies, both agencies have similar workflows for managing air traffic in their distinct and separate air space, and workflow interoperability at the moment and place of hand-off between the two country's air spaces. Since the policies are harmonized, it is also quite clear what data need to be exchanged, and what are the identities, roles, and responsibilities of the air traffic controllers and pilots who are from different organizations.

Compatible Security Frameworks

While security framework compatibility is not a requirement for government interoperability, it is a key consideration for a *successful* interoperability project. Government organizations – ranging from the military to the tax agency to public hospitals – handle large amounts of sensitive information: military secrets, citizens' private data, potential policy directions which can affect the welfare of citizens and companies.

With the sheer quantities of data available and the ease with which information – and mis-information – can proliferate, security and privacy have become extremely hot issues. Data exchange and information sharing between government organizations, or between governments and the private sector, must follow defined policies such as: who has access to the data, what they can do with the information, and how the information is managed and used.

Workflows and services can be designed to ensure compliance with the data exchange and information management policies, and security policies for identity management can ensure that only the authorized people can access the relevant data.

However, if different agencies have different security frameworks which cannot interoperate – policies, technical implementations, workflow controls – then all participating agencies in the collaboration effort can be negatively affected by the "weakest link" in the group, and the data and workflows of all the agencies can become compromised.

In those cases where agencies have completely incompatible security frameworks, a likely result is that no collaboration is possible at all: if one agency only deals in top secret information, and another agency has no capability for working with top secret data, then any attempts for the two agencies to collaborate will never even reach the starting line.

An interoperable security framework is especially critical for the military. When NATO member forces join together for military exercises or peacekeeping missions, the different national forces must share certain information with each other in order for the joint mission to proceed smoothly. At the same time, each member force must protect its national military secrets when that information is not relevant to the success of the joint mission. Without a common security framework such as security classifications and compartmentalizations, it would be impossible to selectively share sensitive but required information while protecting other classified data. Similarly, without an interoperable identity and role management framework such as military rank, these joint missions would not have the necessary command structure to execute effectively.

Technologies for Enabling Interoperability

Although policy harmonization is not dependent on technology, and the other parameters for government interoperability can also be accomplished (theroretically) without significant use of technology, the reality is that governments and their contractors can achieve major efficiencies and increased effectiveness by adopting specific technological approaches designed to promote interoperability.

With the advent of the Internet and web-based services, product companies have placed more emphasis on standards adherence and technology interoperability. Even technologies which were initially designed to compete for the same market – such as Java Enterprise Edition (JavaEE) and .Net – have evolved to co-exist with each other within the same architecture.

The primary reasons for this direction towards technology interoperability are: end users do not care about the implementation technologies or products as long as the services provided meet their requirements; and the market is now so diverse and the product choices so varied that product vendors have to provide interoperability to reach the widest possible customer base. The rest of this section reviews some key technologies which map to the interoperability parameters discussed previously, and serve as a starting point in the design and implementation of any government interoperability project.

Open Standards

After harmonization of policies, one of the major challenges for achieving interoperability – whether it is at the workflow, data, or identity level – is the selection of the right technologies for implementation. A key consideration in this selection is whether the technology being considered is widely adopted and supported by multiple product vendors, and whether the technology complies with industry-recognized open standards.

Over the past decade, a family of web services standards have been ratified to foster interoperability between products from various companies. These standards range from data formats to publish/subscribe services to business process interfaces. Historical competitors such as IBM, Microsoft, and Sun Microsystems have all either adopted these standards for their products or adapted their products to be compatible with other products using these standards. Increasingly, government and commercial services being developed and offered have been abstracted away from dependencies on the underlying operating system or hardware platform. The following describes some standards-based technologies for workflow and services, data compatibility, and identity management.

JavaEE-based SOA Frameworks

A common approach to developing re-usable and interoperable business services is through a service-oriented architecture (SOA). Although SOAs have been around for decades, the development and widespread adoption of web services standards have added new capabilities and extended SOAs into the mainstream of information technology (IT) and application development.

Since services are designed to be logical representations of business processes, when properly built they can be re-used as components to develop entire business workflows. And because these services are built upon open standards, the services from different organizations can easily interoperate with each other to achieve true business integration and government interoperability from a workflow standpoint.

Another benefit of SOA frameworks is the ability to more easily link in the data required as part of the business process or service, enabling greater and smoother data exchange and interoperability. Finally, the use of SOA frameworks permits a more uniform view of all the information that is part of the workflow.

An example of the use of SOA technologies for government interoperability is the UK National Health Service (NHS) Spine project.

Using a Java EE-based SOA approach, the project successfully creates at the point of service delivery a "single patient view" of the patient's healthcare information from across multiple systems and data locations. The NHS SOA approach also manages the integration of disparate business processes across a number of different systems.

Service-oriented architecture frameworks are available from major vendors such as IBM's SOA Foundation, Oracle's SOA Suite, and Sun Microsystems' Java Composite Application Platform Suite (Java CAPS) used by the NHS.

Open Document Format (ODF)

Data exchange and information sharing is an integral aspect of government interoperability, and one of the most complex challenges.

Digital information is diverse and represented in a variety of ways: documents, pictures, videos, charts, audio clips, database records, even information which is generated ad hoc during a particular step in the workflow and which may be non-persistent.

Various formats have been developed to represent these different types of data, including industry standard formats such as xml, mp3, mpeg and PDF. But, until recently, there were no industry standards for editable office documents which make up a significant percentage of the digital information generated and used by governments: documents such as memos, forms, charts, spreadsheets, and presentations.

While popular formats exist which enabled governments and businesses to exchange information, the lack of an industry standard and incompatibilities between different versions of the same applications posed a challenge for governments who have to comply with requirements for information management, long-term document retention, and records archival for historical preservation.

The Open Document Format was created to address the lack of an industry standard for electronic office documents, and its adoption helps close a gap for data exchange and digital information interoperability.

This relatively recent standard has been incorporated into products from several vendors such as IBM and Sun Microsystems, as well as in open-source software community-developed projects such as KOffice.

Many governments are prototyping the adoption of ODF as a default requirement, while NATO has recently announced the inclusion of ODF in its list of mandadory standards for interoperability.

Federated Identity Management

Identity management systems – originally centered around Microsoft Active Directory and other products based on the lightweight directory access protocol (LDAP) – have evolved to include more comprehensive capabilities than just managing user credentials through directory services. Modern ID management systems include:

• The creation, management, and deletion of digital identities and credentials.

• The management of user access to systems through both traditional (such as challenge/response) and non-traditional (such as fingerprint biometrics) means of authentication.

• The management of user entitlements (what the user is permitted to do or access) based on the user's profile, role, location, and other factors.

These new capabilities have enabled organizations to strengthen IT security, provide enhanced and increasingly targeted services to users, and often reduce the cost and complexity of managing user accounts and services through automation and user self-service.

However, most identity management approaches today are based on a (physically or logically) centralized model, with an overall repository hosting user credentials, profiles, access policies, and other parameters required to manage user accounts and attributes. This centralized model works well for distinct and separate organizations such as companies, but does not facilitate inter-organizational interactions required for true government interoperability. Employees of one government agency cannot access the systems of another government agency unless a new user account is created on the second agency's systems. Similarly, citizens who want to access a variety of government services may need to create multiple accounts, one each for each agency they need to interact with.

While the duplication of accounts and credentials is a workable solution for access to multiple government services managed by different government entities, it represents at best an inconvenience to the user and at worst a major security and efficiency detractor. For government employees who need to collaborate across agencies on short notice – such as during times of emergency, the lack of an interoperable identity management solution is a serious defect.

The Liberty Alliance – a consortium of businesses (both IT and non-ITcompanies), educational institutions, and government agencies – has developed standards, protocols, and procedures for enabling federated identity management across multiple, separate, and autonomous ID management systems. Using the federated ID management approach, government agencies can achieve identity and role management interoperability and enable users of one agency to securely access systems of another agency, while preserving the user attributes as defined by the policies of each agency.

Many government entities at the national, state/provincial, and city levels have incorporated aspects of federated identity management to achieve intra-governmental access or deliver cross-agency citizen services. At the federal or central level, these include: Australia, Belgium, Denmark, Italy, Norway, Portugal, Turkey, and the United States.

State and provincial governments adopting federated identity management include: Tuscany Regional Government, Social Security Agency (INPS), Ministry of Transportation in Italy, New York, New Jersey, Massachusetts, Pennsylvania, and California in the US, the Canadian province of British Columbia, and the Victoria state government in Australia. At the city government level, cities using federated ID management for cross-agency interoperability include: Shenzhen in China, Sunderland in the UK, and Pierrefitte and Vandoeuvre-les-Nancy in France.

Multi-level Secure Operating Systems

Service-oriented architectures, industry standard data formats, and federated identity management are important technologies for fostering government interoperability. But, in many parts of government – such as in defence and law enforcement, a common security framework is necessary to ensure that interoperability is strongly secured and that access to information is protected according to the harmonized security policies between organizations.

An information technology model called multilevel security (MLS) is frequently used by government agencies which have to manage information with different levels of sensitivity; manage users with different levels of authorizations; and enable cross-organizational or cross-domain collaboration. MLS-based operating systems enable these fine-grained security policies and controls on workflows and applications, data, and identity and role management of users within the organization and across different organizations.

France Police	Italy Police Turin	Italy Police Rome
Fr National	Italy National 1	
Cross-border		Not defined
Fr Regional A	Italy National 2	
Fr Regional B	Turin Regional	Rome Regional

Table 1. Illustration of Hierarchical and Compartmental Security Across Organizations under MLS

Table 1 illustrates some typical challenges associated with interoperability issues when different organizations with different policies have to collaborate with each other. In this fictional scenario (for illustration purposes), the French police have four levels of security policies: at the national level, cross-border, regional level A, and regional level B. The Italian police, however, have only three levels of security policies: national level 1, national level 2, and regional which is different between Turin and Rome.

Using MLS techniques, the French police and the Italian police in Turin can map their respective policies and determine how to harmonize security polices for cross-border interoperability. Once the different organizations' hierarchies and their relationships and equivalence to each other are determined, then the policies governing how workflows, data exchange, and identity management can be developed for optimal interoperability.

An MLS operating system (such as Trusted Solaris from Sun Microsytems or Security Enhanced Linux from Red Hat) can then provide the common security framework to enforce compliance with the policies which have been developed and agreed upon between the different entities.

CONCLUDING OBSERVATIONS

Government interoperability has become a concrete requirement, driven by both citizen and business demands as well as national policies for collaboration. This collaboration takes place between different national governments, different agencies within the national and regional/local levels, and between different levels of government within a country. While interoperability can result in many benefits – such as cost reductions, improved citizen services, enhanced national security, and increased efficiencies in operations – it also presents significant challenges to implementation.

These challenges include policy harmonization between the participating organizations which is prerequisite to the successful implementation of government interoperability. Harmonized policies define the framework to clearly and effectively address the other key components necessary to interaction and collaboration between multiple government agencies: workflow and services interoperability; data exchange and information sharing; and cross-organizational identity and role management.

The use of information technology to improve government services has also contributed to interoperability obstacles. To minimize these problems, the selection of open standards-based IT products as part of the agency's architecture is paramount – without harmonized policies and open standards-based products, interoperability projects will inevitably fail.

Service oriented architectures using Java EE based technologies are recommended for the development and implementation of business workflow and services. Adoption of industry standard data formats such as XML and Open Document Format (along with many others, depending on the type of digital content involved) will greatly reduce the complexities and costs for information sharing and data exchange. Federated identity management solutions and its extension to role and policy-based administration of entitlements has emerged as a necessity for government interoperability and ubiquitous e-government citizen services. Environments requiring strong security and differentiated user access to information with varying levels of sensitivity will benefit from the fine-grained security mechanisms of a MLS operating system. Together, this set of technologies can help overcome the major challenges to government interoperability, and help deliver on the two major functions expected of governments everywhere – to protect and serve its constituents.

Towards an Intercultural Representation of Mediterranean Intangible Cultural Heritage (Ich). An Xml Interoperability Framework for Regional Ich Databases

Jesse Marsh
Atelier Studio Associato
Palermo, Italy
jesse@atelier.it

Francesco Passantino
iteam5.net
Palermo, Italy
francesco@iteam5.net

ABSTRACT

In this paper, we address the issue of interoperability for regional databases of Intangible Cultural Heritage (ICH). Work carried out in the INTERREG IIIB MEDOCC "MEDINS" Project aimed to apply a common cataloguing system as an application of the UNESCO 2003 ICH Convention. The project activity "Multimedia Laboratories" offered an alternative approach, with a simplified, navigation-oriented web service capable of incorporating Web 2.0 features while aggregating items from different regional databases in an intercultural context. The co-design development process of the prototype is described, and the XML code defined to link to data from different sources is illustrated. In conclusion, lessons learned and future development issues are set forth.

KEYWORDS

Interoperability, Intangible Cultural Heritage, MEDINS, XML

Background: ich and the interreg iiib "medins" project

The safeguarding and valorisation of Intangible Cultural Heritage (ICH) has been a subject of increasing concern, as illustrated by the following excerpt from the UNESCO Web site:

"According to the 2003 Convention for the Safeguarding of the Intangible Cultural Heritage, the intangible cultural heritage (ICH) – or living heritage – is the mainspring of our cultural diversity and its maintenance a guarantee for continuing creativity. The Convention states that the ICH is manifested, among others, in the following domains: oral traditions and expressions including language as a vehicle of the intangible cultural

154

heritage; performing arts (such as traditional music, dance and theatre); social practices, rituals and festive events; knowledge and practices concerning nature and the universe; traditional craftsmanship.

The ICH is traditional and living at the same time. The depository of this heritage is the human mind, the human body being the main instrument for its enactment, or – literally – embodiment. The knowledge and skills are often shared within a community, and manifestations of ICH often are performed collectively. Many elements of the ICH are endangered, due to effects of globalization, uniformization policies, and lack of means, appreciation and understanding which – taken together – may lead to the erosion of functions and values of such elements and to lack of interest among the younger generations."

As the UNESCO 2003 Convention is being slowly adopted by EU member states (11 of 27 have yet to become State Parties) regional administrations and university research centres have already begun working on ways to protect and valorise ICH.

At the basis of any policy to maintain ICH alive are initiatives for its documentation and cataloguing, which normally fall under the mandate of regional authorities. This activity is more difficult than appears at first sight, considering that ICH is in fact immaterial on the one hand – one can only take a photo of its outcome but not the knowledge behind the process – and socially constructed on the other: typical recipies often have variations from family to family and town to town and may vary over time, making it difficult to define which is the "authentic" one.

In addition to these structural issues there is the practical fact that regional and national policies regarding ICH are all relatively recent, vary widely in scope, and may have more or less direct links with policies regarding material cultural heritage, the kind conserved in museums or listed as monuments or archaeological sites. There is thus much less of a consolidated practice for ICH databases, which sometimes are not even self-standing archives.

Yet the possibility of consulting catalogues of ICH spanning different territories and cultures is fundamental to the understanding of ICH itself. Full appreciation of, say, a Sfincia di San Giuseppe (a Sicilian pastry) requires an understanding of its Arabic origins and relation to similar recipes such as the Cassata. In addition, the pastry is part of the celebration of the Feast of St. Joseph, the Patron Saint of Bagheria; it is thus part of a broader celebration with its rituals, processions, costumes and chants, etc. A purely regional archive may contain information about the Sfincia from the standpoint of Sicilian culture, but can never take us to processions of St. Joseph in Spain, nor give us an understanding of religious processions as a Mediterranean phenomena in general. This requires a broader, inter-cultural vision that can only be attained through a seamless inter-connection of the archives of different regions.

In order to address these issues, the EU-funded INTERREG IIIB MEDOCC project "MEDINS: Identity is Future. The Mediterranean Intangible Space" brought together 11 EU and 2 MEDA partners, consisting mainly of universities and local and regional authorities across the northern Mediterranean area. The Lead Partner of MEDINS was itself a regional authority, the CRICD (Regional Centre for Inventory, Cataloguing and Graphical, Photographical, Aero-photographical, Photogrammetrical and Audio-visual Documentation of Cultural and Environmental Goods) of the Sicilian Region.

The MEDINS consortium included six other partners in Sicily – PIT Demetra, Unimed, COPPEM, the City of Bagheria, Herimed and IWORLD – the University of Evora in Portugal, the Spanish Region of Murcia, the Local Councils Association of Malta, TEDKNA and the Municipality of Kalivia in Greece, and the Region and City of Rabat in Morocco. Project activities also involved organisations from Tunisia, Egypt and Lebanon.

Classification Systems and the Sicilian REI

The starting hypothesis in MEDINS was a concept first developed in the Sicilian Region called the "REI: Registro dell'Eredità Immateriale" (Register of Immaterial Heritage). This system, introduced in 2005, proposes itself as a direct application of the UNESCO Convention at the regional level.

The REI loosely transforms the five domains identified by UNESCO as above into five "books" (Celebrations, Knowledge, Places, Expressions, and Living Human Treasures) in which the ICH elements of greatest value are to be inscribed. It acts as a tool for regional ICH policy in that inscription in the REI implicitly entitles an element to priority status in obtaining regional funding.

One of the first project activities in MEDINS was a survey of national and regional normative frameworks and cataloguing systems for ICH in the participating regions. This study revealed, not unexpectedly, a fragmented and piecemeal legislative framework.

One of the main issues is whether or not regional authorities implement ICH policy as an extension of on-going cultural heritage policy or as a new sector. In the first case, the approach is to broaden the scope of existing catalogues, adapting the classification system but leaving many of the descriptive fields as they are.

For example, the Sicilian Regional Catalogue (apart from the REI initiative) already lists a range of ICH elements such as festivals and street markets, while the Region of Murcia added 10 ICH-specific categories to its existing system: Oral tradition; Music and Sound; Scenic Expression; Festivities; Ritual; Popular Games and Sports; Gastronomy; Traditional Medicine; Social Institutions; and Handicraft.

In the case where entirely new systems are developed specifically for ICH, these are often ad-hoc or temporary systems, though in any event closer to the UNESCO Convention's definitions and more tightly suited to the specific nature of intangible heritage.

In MEDINS, one of the main lines of action was thus to test the relevance and applicability of the REI registry system across different institutional and cultural contexts in the Mediterranean basin.

The hypothesis was that the REI's five books were general enough to be able to incorporate more detailed classification systems such as that of the Murcia Region, bringing them closer to the UNESCO framework.

Here it must be remembered that the REI is a registry and not a catalogue, in the sense that it contains elements selected by a commission of experts but it does not describe them nor contain other documentation such as photographic or video material.

156

This is indeed also the driving concept of the UNESCO Convention which, like the more well-known listing of World Heritage Sites, aims to establish a global "Urgent Safeguarding List" and "Representative List" containing the most endangered and important elements of ICH. [4]

UNESCO Domains	Sicilian REI	Murcia Region
Performing Arts	Celebrations	Oral Tradition
		Music and Sound
Social Practices	Knowledge	Scenic Expression
		Festivities
Rituals and festive events	Places	Ritual
		Popular Games & Sports
Knowledge and practices conc. nature and the universe	Expressions	Gastronomy
		Traditional Medicine
Traditional craftsmanship	Living Human Treasures	Social Institutions
		Handicraft

Table 1. Comparison of ICH Classification System

While the REI may prove effective as a regional policy tool and a bottom-up channel to feed the global UNESCO lists, MEDINS partners encountered difficulties in establishing the relationship between the REI and their existing cataloguing systems. The difference between a registry list and a cataloguing system emerged as creating significant operational and institutional problems.

The question thus arose of whether a unique cataloguing system would be possible, but also whether it was actually necessary in order to enable a common, trans-Mediterranean registry.

Further, the question arose of the role and value of the Mediterranean dimension: does Mediterranean cultural heritage emerge from the sum and juxtaposition of, say, different ways of celebrating a wedding, or are there specific trans-national elements, e.g. the Mediterranean diet, to be identified?

Multimedia Laboratories, Web 2.0, and the Herimed Transporter

In parallel, another MEDINS activity – the Multimedia Laboratories – aimed to address the project's key objectives from a different perspective. Here the approach was to freely examine the role that new technologies can play in promoting ICH in all aspects, from video-blogs supporting anthropological research to web forums enabling communities to debate on the best recipe for a local gastronomical specialty. Each participating partner chose to experiment different tools, including Web 2.0 or social networking approaches such as the CommunityWalk map of Bagheria, which any citizen can enrich by adding an element of ICH to the map together with a description and photo or video.

Figure 1. The Bagheria Community Walk Map. [7]

The experimentation of Web 2.0 services in MEDINS intended to explicitly challenge the UNESCO and REI's top-down approaches which are based on "expert" knowledge and the hierarchical taxonomies widely adopted in biology and anthropology since the 19th century. If widespread participation is engaged, then the open and "flat" technical principles underlying Web 2.0 services can be used to unleash collective community knowledge for identifying and valorising ICH, meaning that top-down, pre-defined taxonomies may no longer be necessary.

Tags – deceptively similar but substantially different from keywords – introduce a social and personal dimension to classification, whereby their collective usage in relation to what is being tagged becomes an indicator of tastes, beliefs and inclinations.

This shifts the emphasis from the "element" of ICH to the community that "embodies" it, with social networks developing that knowledge in an ongoing dynamic, communicational learning process. Indeed, a new term has been coined to describe "the spontaneous cooperation of a group of people to organize information into categories": folksonomy.

At the outset, it appeared that the Web 2.0 approach could somehow be complementary to the REI, as though the two represented the extremes of top-down selection and bottom-up participation which could somehow co-exist at a harmonious distance. As the search for a common database structure ran into difficulty, it appeared increasingly evident that an integration of the two approaches was necessary. Herimed, one of the partners in the Multimedia Laboratories activity, proposed to realize a prototype web Named after the device in the science fiction series Star Trek, used to transport people from the Starship Enterprise to nearby planets and made famous by the phrase "Beam me up, Scotty"service that would display resources from different partners' databases but also open to public contributions. The service would be based on a simplified common data format that enabled consensus to be readily reached, since it aimed only to provide an interchange data structure for the web rather than a universal solution to the debate on cataloguing systems. In addition, realization of the first prototype was a relatively quick processes, allowing partners to appreciate the impact of the multimedia presentations and the immediacy and potential of navigation between cultures.

Figure 2. The Herimed Transporter Interface. [8]

Different partners showed interest in inserting elements from their local archives into the simple database of the Herimed prototype – later dubbed the "Transporter"[27] – and this activity became the focus of a three-day Multimedia Jam hosted by the City of Bagheria in late May 2008. During this event, participants – mainly researchers in anthropology – interacted with the web designers to collectively develop the prototype in different ways.

Firstly, partners discussed the simplified data structure in relation to their own archives, and tried to identify hands-on how their existing material could be adapted. This included the development of agreed conventions for some fields such as "location" as well as attempts to construct Tag sets or otherwise use the information in their files as potential navigation paths through the Transporter system.

NOTES

[27] Named after the device in the science fiction series Star Trek, used to transport people from the Starship Enterprise to nearbyplanets and made famous by the phrase "Beam me up, Scotty".

Secondly, partners learned to use social software platforms such as Flickr and YouTube as repositories for their own files as well as resources through which to find new material and thus enrich their descriptive entries with multimedia. In addition, they entered their geographical information as latitude and longitude co-ordinates in order to allow the Transporter prototype to automatically generate location maps.

Figure 3. The Blog of the Bagheria Multimedia Jam.

Finally, partners decided to use the classification system developed in another project activity, the Semantic Framework, as an agreed set of categories. This abstract, taxonomical representation of ICH incorporates classifications from all partners, as a common reference framework. Partners discovered that it could be usefully incorporated into the Transporter prototype on the condition that, for a given entry, more than one category could be applied. While the hierarchical taxonomy is maintained, its use is thus closer to a tagging system than a rigid classification requiring a unique choice.

Figure 4. Data Entry Form for the Transporter Prototype

Through this process, the Transporter prototype that emerged from the Bagheria Multimedia Jam acquired a specific character. By shifting the emphasis from storage to navigation, it mixes elements of the traditional classification system with Web 2.0 elements. Although the initial perception among partners was of a standalone common database – albeit one containing only the essential information for each ICH element – its usefulness emerged more as a tool through which to access the original databases. In fact, one of the most important features of the transporter is the possibility, where appropriate, to move from the generic presentation offered by the prototype into the original context of the ICH element, whether that be a point on the Bagheria CommunityWalk map or a detailed catalogue entry in the Murcia Region's archives.

There are thus two specific environments in which an ICH element is represented: the Transporter, with a simplified representation but within a multi-cultural context, and the original database, with the context and full information provided by the source institution.

The Xml Granada Code

At this point, the interoperability requirements peculiar to the Transporter began to emerge with clarity. While the prototype developed in the Bagheria Jam demonstrated an essentially "manual" simulation linking the common web service to different ICH archives, the ultimate goal was to somehow make the same process automatic. Making progress in this direction was the objective of the second Multimedia Jam, held in Granada end June 2008.

In the Granada meeting, the structures of two databases were examined: that of the University of Granada and the Region of Murcia. As discussions developed on how to map the fields of the two databases onto the scheme of the Transporter, a draft XML code – dubbed the "Granada Code" – was devised to simplify the process of transferring records. The Granada Code is built on the fields of the Transporter as a common interface, so that the administrators of external databases can map their data onto it either in batch mode or through a dynamic link. Whichever approach is adopted, the Granada Code is structured so that the multimedia contents remain in the original database for reasons of both integrity and property rights. In its current implementation, the Transporter assumes that local database administrators generate a full XML file on a regular basis – a sort of cache file – in order to limit the number of direct accesses to a minimum.

Local Record Information

In its draft form, the Granada Code consists of four main sections, each of which reflects a specific feature of the Transporter concept. The first block contains the local record ID information and, most importantly, information about the host institution <organisation> as well as the location of the original file <item_URL>. This enables one of the most important features of the Transporter, namely the direct link to the original file in the source database.

```
<?xml version="1.0" encoding="utf-8"?>

<schede>

<date_post>2008-02-07 T00:00:00 </date_post>

organization>Comune di Bagheria </organization>

<user>Jesse Marsh</user>

<license>nc-nd</license>

<id_form_local>1</id_form_local>

<item_URL>http://www.iteam5.net/francesco/medins/default.asp?id=1</item_URI>
```

In the above, the post date of the item allows the Transporter to poll the original database to verify if the record has been updated; in that case, the new version of the record is generated.

The <license> field refers to the Creative Commons licensing system, with the IPR attribution assigned by the local administrator. The public version of the prototype will foresee the use of streaming technology to protect, where appropriate, media files from unauthorized downloads.

Simplified Ich Description

The second block of code contains the descriptive information, following the layout of the simplified data format at the origin of the Transporter prototype:

```
<title>Sfincia di San Giuseppe</title>

<lat>38.09235</lat>

<lng>13.50571</lng>

<language>English</language>

<description>

<p>The Sfincia di San Giuseppe, or sfincia (from the Latin spongia,

...

ricotta cream and topped with orange peels and crushed pistachios.</p>

</description>

<tag>sfincia, san giuseppe, father's day, sugar, ricotta</tag>

<localisation>Bagheria, Palermo, Sicily, Italy</localisation>

<definition>Ricotta-filled pastry </definition>

<local_definition>Sfincia di San Giuseppe </local_definition>

<qualification>Linked to religious event </qualification>

<occasion_type>Religious occasion </occasion_type>
```

```
<occasion_name>Feast of San Giuseppe </occasion_name>
<periodicity>yearly</periodicity>
<per_start>March 19</per_start>
<per_end>March 19</per_end>
```

The above code contains fields with different levels of constraints: <description> is free-form text, while <location> follows an agreed sequence of NUTS level specifications and <qualification> uses terminology specific to the field of Anthropology. Fields can be left blank if not applicable (e.g. <periodicity> for a wedding dress) or if simply not held important (some partners preferred not to use the field <qualification> at all). There was and still is much discussion on the use of the Tag field.

Can the Tags be automatically compiled by taking the main words from a set of other fields? Should all Tags be in English to allow for smoother navigation? Should a specific set of Tags be defined for inter-cultural purposes, or would this betray the open nature of "folksonomies"? Another issue requiring further development is the capability of dealing with multiple language versions of the same ICH item. This will probably involve an expansion of the XML structure, which will then branch out on the current <language> field.

Categories and Related items

The third XML section makes reference to the classification system of the semantic framework, which for purposes of flexibility is left outside of the Granada Code. In its current state, the semantic framework has been transferred into a table form as an external resource which can be modified in an on-going fashion by adding or re-mapping listings.

Each category is then given a unique number referenced by the XML code and dynamically accessed by the Transporter, so the section in the Granada Code appears as below (note the listing of multiple categories). Even in its current form, the use of the evolving Semantic Framework allows for a "scientifically validated" navigational structure alongside the more open navigation possibilities using the tags or descriptive fields above.

```
<cat_form>
<cat>35</cat>
<cat>25</cat>
<cat>37</cat>
</cat_form>
<related>
<rel>2</rel>
<rel>5</rel>
</related>
```

In a similar fashion, the Transporter prototype displays a list of "Related Items" that is currently a simple listing of the ID numbers of other records held to be relevant by the local expert.

Although this is a useful feature for navigational purposes especially when the database contains few entries for a given region or topic, its full-scale implementation would probably require the development of an expert system that correlates different records on the basis of descriptive content or navigation histories.

Multimedia Content

The final section of the Granada Code accesses the multimedia content that illustrates the specific element of ICH.

This can range from one or more photos to maps, videos and audio files that are stored either within the different databases – though externally accessible to the Transporter – or in a public social network service.

In order to build a shared collection of multimedia materials MEDINS partners chose to utilise one service for each media (Flickr, YouTube, Odeo, SlideShare, GoogleMaps , and CommunityWalk and in each case use the Tag "MMMedins" as a common identifier. Within the Transporter, it is possible to display multiple content items.

In the example below, a Flickr slideshow is composed using the Tag "sfinci"; this dynamically assembles a group of images that in the case in question includes both items uploaded by the City of Bagheria and images published by other Flickr users:

```
<form_content>

<content_order>1</content_order>

<label>slideshow</label>

<embed>

<iframe align="center"

src="http://www.flickr.com/ slideShow/index.gne ?tags=sfinci&amp;"

frameBorder="0" width="425" scrolling="no" height="355">

</iframe>

</embed>

</form_content>

</schede>
```

Results, Lessons Learned And Future Work

In this paper we have discussed the issue of Intangible Cultural Heritage (ICH) as defined by the 2003 UNESCO Convention and the need for interoperability across regional databases of ICH elements, as a means of better promoting and safeguarding ICH through a deeper understanding of the traditions and heritage of a region such as the Mediterranean. The EU-funded MEDINS Project, which addressed the issue of developing a common cataloguing system for ICH, experienced the barriers and difficulties normally experienced in attempts to reach consensus on a unique database structure. Through the work of its Multimedia Laboratories, however, an innovative concept emerged of a simplified, navigation-oriented web service capable of incorporating Web 2.0 features while aggregating different regions' elements of ICH in a comparative context and then linking to the source archive for detailed information on a given element. Development of this system, known as the Herimed Transporter, occurred through a series of Multimedia Jams in a process of participatory development based on fast protyping. In order to allow for full interoperability in the link between different databases via the Herimed Transformer, an XML code was developed in draft form.

As it currently stands, the Granada Code's four-part structure clearly highlights the distinctive approach to interoperability that characterises the Herimed Transformer. It is not a pure inter-connection of the different databases, as it presents a visible aggregation interface between them; although it creates links between different regional archives, it does so through a range of navigational possibilities as compared to a common definition of static data fields.

The main lesson learned in reaching this innovative result has been the importance of the co-design method adopted by the inter-disciplinary group of anthropology researchers and web service designers, each an "expert" in their own field and a "normal person" for the others. In the intense collaborative environment of the two Multimedia Jams, solutions emerged bridging these confines, and the concept of interoperability shifted from a purely technical problem to one of multi-disciplinary and inter-cultural communication. The end product is genuinely the collective work of all of the participants in these events.

Currently, the prototype version is being engineered into a more stable implementation. This will allow MEDINS partners and new actors to test the navigational structure with a critical mass of entries represented, thus leading to a second phase of refinement of the semantic framework, the web presentational structure, and the Granada Code itself. In this process, several issues that have been only briefly addressed to date will need to be explored in further detail:

• Multi-lingual features.

• Extension to regions beyond the Mediterranean.

• Implementation of social network features such as Comments, Most Popular etc.

• Expert systems for suggesting navigational options.

• The balance between institutionally-validated information and social knowledge captured through Web 2.0 approaches.

A key issue for uptake by regional authorities and the UNESCO community will in fact be the Transporter's ability to incorporate both the "scientific" and the "social/community" dimensions of ICH regarding the content it contains, the navigational structure it offers and the clarity with which it distinguishes between different kinds of validation of information. As with the experience of the Multimedia Jams, the ultimate objective is to bring the scientific and social communities together, using both social and technical interoperability as a platform for building awareness of our intangible cultural heritage and bringing us closer to the goals of the UNESCO 2003 Convention.

Acknowledgments

REFERENCES

[1] http://www.unesco.org/culture/ich/

[2] http://patrimoniounesco.it/beniimmateriali/rei/rei.htm

[3] http://whc.unesco.org/en/convention

[4] "Draft Operational Directives for the implementation of the Convention" ITH/08/2.GA/CONF.202/5, http://www.unesco.org/culture/ich/index.php?pg=00152

[5] Marsh J. 2007, "Web 2.0: How Emerging Non-Institutions Organize Knowledge", www.cidehus.uevora.pt/textos/actas/medins07/9-Jesse_Marsh-BAGHERIA.pdf

[6] The Wiktionary definition at http://en.wiktionary.org/wiki/folksonomy

[7] http://www.communitywalk.com/mmmedins_bagheria/map/206461

[8] (the current address for the prototype, exclusively for consultation by reviewers, is www.iteam5.net/francesco/medins an institutional address will be provided in time for the publication deadline).

[9] http://www.flickr.com

[10] http://www.youtube.com

[11] http://mmmedinslab.blogspot.com

[12] http://odeo.com

[13] http://www.slideshare.net

[14] http://maps.google.com

[15] http://communitywalk.com

Castile and Leon, a Model of Interoperability

Isabel Alonso Sánchez
Consejera de Administración Autonómica, JCYL
Valladolid, Castilla y León, España
alosanis@jcyl.es

José Ignacio de Uribe Ladrón de Cegama
D.G. de Innovación y Modernización Administrativa, JCYL
Valladolid, Castilla y León, España
uriladjo@jcyl.es

Antonio Francisco Pérez Fernández
D.G. de Innovación y Modernización Administrativa, JCYL
Valladolid, Castilla y León, España
perferan@jcyl.es

Jorge Ordás Alonso
D.G. de Innovación y Modernización Administrativa, JCYL
Valladolid, Castilla y León, España
ordalojo@jcyl.es

ABSTRACT

The Castile and Leon Government (JCYL), in its tireless efforts to modernise the Administration, presents in this document a view of innovation and support to the introduction of a complete framework of interoperability within its territory. It also takes into account the enlargement of such framework with the aim of being part of a superior model of interoperability of a national, European and international nature. This will allow it to achieve a full administrative interrelation as the only way to reach the modernisation of the European public sector, which will allow to satisfy the needs of citizens and companies alike.

KEYWORDS

Interoperabilidad, eGovernment, Junta de Castilla y León, Castile and Leon Government, Regional Strategy for the Digital Information Society of Castile and Leon 2007-2013, Strategic Modernisation Plan for the Public Services of Castile and Leon, SOA, EAI, ESB, UDDI, Web Services, WS-Security.

REFERENCE BACKGROUND

These last years; interoperability[28] the main actor in this meeting, has become one of the basis and an essential condition to provide high quality telematic services to citizens and companies.

Next, the reference initiatives to boost e-administration are summarized and, in particular, interoperability depending on the different territorial spaces; European, Spanish and Castile-Leon.

1.1 European level

The Decision 2004/387/CE[29] of the European Parliament and of the Council of 21 April 2004 on Interoperable Delivery of Pan-European eGovernment Services to Public Administrations, Business and Citizens (IDABC Programme 2005-2009), states the importance of the interconnection of Europe in order to consolidate its internal market, and highlights electronic communications as a powerful motor for growth, competitiveness and employment inside the European Union.

It also shows the necessity of taking the necessary steps to consolidate such a boosting and so contribute to the Lisbon targets.

On the other hand, the European Union has relaunched the Lisbon Strategy and emphasizes the association for the growth and employment through the initiative i2010 – "A European Information Society for growth and employment"[30], This suggests the creation of a Common Information European Space as one of the three priorities of European policies regarding the Information Society.

This document also deals with the four big challenges to tackle for the creation of such space, namely, speed, content richness, interoperability and security.

This highlights once again the essential role of the interoperability with regarding the Information Society and the modernisation of the Administrations.

In 2006, the Communication from the Commission to the Council and the European Parliament – "Interoperability for PanEuropean eGovernment Services"[31], shows how the interoperability of e-administration services, based on open standards, has became a transversal task of an essential importance.

NOTES

[28] In this document, interoperability is defined as the capacity the computing systems - and therefore, those proceedings they support- have to exchange information and to allow information interchange between them, as states 11/2007 Act, of July 22, for the electronic access of citizens to Public Services. http://www.boe.es/boe/dias/2007/06/23/pdfs/A27150-27166.pdf.

[29] DECISION 2004/387/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 April 2004 on interoperable delivery of pan-European eGovernment services to public administrations, businesses and citizens (IDABC). http://europa.eu.int/eurlex/ lex/LexUriServ/site/en/oj/2004/l_181/l_18120040518en00250035.pdf.

[30] Brussels, 1.6.2005. COM(2005) 229 final. COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE EUROPEAN PARLIAMENT, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS "i2010 – A European Information Society for growth and employment"{SEC(2005) 717}. http://eurlex. europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0229:FIN:EN:PDF.

The Member States are responsible for the interoperability of their own systems, but in spite of this, interoperability at an European level, which is necessary to apply common policies and priorities of the European Union, demands cooperation and coordination; and it is entitled to occupy an outstanding position in the agenda of the European Union, and, specially, between the strategic framework i-2010 and the initiatives and programmes related to it.

1.2 Nationwide level (Spain)

In the Spanish territory, the State General Administration has enlarged our legal system regarding citizens electronic access to public services, which is nowadays a granted right, with the development of the 11/2007 Act[32].

This text means a boosting without precedent to modernise and computerise the public services. Its articles provide a great amount of ideas, which give priority to interoperability as a means to achieve those aims that allow the Spanish public services to be part of the Information Society.

Thus, it regulates the cooperation principle in the use of electronic means by Public Services with the aim of guaranteeing the interoperability of those systems and solutions adopted; it mentions the necessity of developing a National Interoperability Plan and, it admits the citizens right of no providing any data or document in the hands of the public services.

The Fourth Title means a final support to interoperability; it is devoted to the Cooperation between Public Administrations to boost e-administration. Its Article 41 states: "Public Administrations will use Information Technologies to relate with other Administrations and with citizens, applying computer, technological, organizational and security measures to guarantee an appropriate level of technical, semantic and organizational interoperability".

Within this national scope, the Ingenio 2010[33], programme was launched in June 2005, its aim is the promotion of technical innovation and of the Information Society, in reply to the relaunched Lisbon Strategy.

This programme stems from the strategic R&D&I axes of the National Programme for Reforms designed by the Spanish Government and, one of its three main aims is to reach the European Union average of percentage of GDP assigned to Information and Communication Technologies (ICT). It is based on the Plan Avanza[34], one of its key axes.

The boosting due to this Plan Avanza7 allows us to converge on this 7% of the GDP invested in ICT for the year 2010. The aforementioned Plan also gives interoperability its deserved role, with three measures:

NOTES
[31] Brussels, 13.2.2006. COM(2006) 45 final. COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT. "Interoperability for Pan-European eGovernment Services". http://europa.eu.int/idabc/servlets/Doc?id=24117.
[32] 11/2007 Act, of July 22, for the electronic access of citizens to Public Services. http://www.boe.es/boe/dias/2007/06/23/pdfs/A27150-27166.pdf.
[33] INGENIO 2010 Programme, http://www.ingenio2010.es.
[34] Plan AVANZ@, http://www.planavanza.es.

170

- The PIT.02 measure – Planning in advance of the demand of ICT by Public Administrations, whose aim is to take advantage of the potential of public purchases to revitalize the industrial sector invigorating the interchange of experiences between Administrations, and the coordination between the State General Administration and the Autonomous Communities for the development of common services within a common framework of interoperability.

- The AE.10 measure – Common Services Platform, which eases the development of common services for the combined use by Administrations and which guarantees interoperability.

- The AE13 measure – Interoperability: Recommendations and Standards for Public Administrations, whose aim is to design and develop a common administrative architecture programme to guarantee the interoperability of solutions and which will result in a set of recommendations and standards for Public Administrations.

1.3 Autonomous Community level (Castile and Leon).

Paying attention to the scope of our responsibility, the Administration of the Autonomous Community of Castile and Leon has also carried out many actions with the aim of modernising the Administration and establishing, based on the interoperability model, all the necessary elements to endow citizens with electronic procedure capabilities with the suitable legal guarantees. In this context, in May 2005 and as a result of the change process the Community of Castile and Leon was undergoing, Decree 40/2005[35] was past, whereby the use of e- administration techniques by the Administration of the Community of Castile and Leon is regulated. It means a final legal step for the implement of the tools included in the e-administration platform of the Castile and Leon Government.

The ICT world evolves, this is a fact, and the Castile and Leon Government has not stayed behind, everyday it tries to take those steps which allow us to reach the aims of the 11/2007 Act. In this sense, two essential initiatives must be highlighted in this process of mod hereinafter ERSDI, and the Strategic Modernisation Plan for the Public Services of Castile and Leon 2008 – 2011.

The ERSDI[36] develops a set of strategic lines, which can be summarized at global level, in a unique objective, textually: "To advance determinedly in the incorporation of the Autonomous Community of Castile and Leon to the Digital Information Society, by taking advantage of the potential of the Information and Communication Technologies as a tool to facilitate the economic development, the improvement of business competitiveness and productivity, social and territorial equality, the improvement of the quality of life of the citizens…, in short, the growth of welfare".

A new set of eight strategic lines stem from the strategic guidelines; three of them are tightly linked to the aim of this document and which will be developed next.

NOTES

[35] Decree 40/2005 of May 19, whereby the use of e- administration techniques by the Administration of the Community of Castile and Leon is regulated. http://bocyl.jcyl.es boletín del día 25 de Mayo del 2005.
[36] ERSDI, Regional Strategy for the Digital Information Society of Castile and Leon 2007-2013, http://www.jcyl.es/scsiau/Satellite /up/es/Institucional/Page/PlantillaDetall eContenido/1180952673338/Comunicacion/1180419862739/_?asm=jcyl&tip oLetra=x-small

1.3.1 Telecommunications Management Plan

It aims to guarantee affordable and good quality telecommunication infrastructures and services. In this strategic line stands out the initiative "Advanced Telecommunications in the Administration".

This initiative emphasizes the important role of the Castile and Leon Government in the use of innovative technologies, and concerning the interoperability between the Administrations of its territory. In this sense, and after the start up at a national level of the SARA system (System of Applications and networks for the Administrations), the Castile and Leon Government has begun to work to create a regional neutral node which will allow the connection between SARA and the systems of the Castile and Leon Government, the Provincial Councils and the Town Halls of the region.

1.3.2 Digital Municipalities of Castile and Leon

This strategic line fosters the adoption of some measures for the boost of the Digital Information Society in the municipalities of the Community, as well as the e-administration and interoperability. In this context, the initiative "Network of Digital Municipalities of Castile and Leon." is presented, and it patronize the platforms of common use to be based on standards "de jure" or "de facto", as such the IP protocol for data transmission and the XML format for information interchange.

1.3.3 E- Administration

Strategic line whose aim is to exploit to the maximum the possibilities of the e-administration to provide more effective and quality public services, allowing the citizen to choose the channel he will use to relate to the Administration. To achieve this, it emphasizes the necessity of coordinating actions, the consolidation of the Single Administrative Information System (SIAU), the start up of the on-line formalities and the interoperability between Administrations. Within its initiatives stands out the "Global interoperability" as the capacity of information interchange between computer systems at the three levels of the Public Administration.

The Castile and Leon Government knew how to respond to the challenge and has put all the resources at its disposal into practice in order not left behind from this boosting and to locate the region in a position of advantage as regards the other Autonomous Communities. On the other hand, the Castile and Leon Government works to achieve a modernisation of the Administration of Castile and Leon and that effort results in the Strategic Modernisation Plan for the Public Services of Castile and Leon 2008-2011.

This strategic plan manifests the Castile and Leon Government intention to support the modernisation and innovation by means of the creation of the "Dirección General de Innovación y Modernización Administrativa", of which we are part, and whose aim is to take advantage of the full administrative interrelation and the technological and networking interoperability to develop a true intelligent and quality management of public services to the benefit of citizens.

The Strategic Modernisation Plan for the Public Services of Castile and Leon 2008-2011[37] determines six strategies, namely: an easy, intelligent, pushing, open, responsible and integrator Administration. These strategies are composed of a total of twenty programmes which define some performing guidelines. In this document, we deal with interoperability, and in this sense and within the strategy of an "Easy Administration", the "En red" programme is developed. Within its performing guidelines, the 25 line should be highlighted: "Promotion of inter-administrative cooperation and interoperability".

DESCRIPTION OF THE PLAN

Castile and Leon has a land area of 93,898 Km2 and a population of 2.5 million inhabitants scattered in 2,247 municipalities. Hence, Castile and Leon is the larger region in Spain and it has the largest number of municipalities. Castile and Leon has 9 provinces and 2,247 municipalities exactly, this help us to realize the difficulties to achieve an interoperability model which allows the interchange of information between the systems of 9 Provincial Councils and 2,247 municipalities. Moreover, we must take into account that the number of inhabitants of many of these municipalities is very short; hence this level also presents a distinction between those municipalities with a large capacity of investment in Information technologies and those with a lesser one.

We have already mentioned that one of the main initiatives of the Strategic Modernisation Plan for the Public Services of Castile and Leon 2008-2011, in its strategic line 'E-Administration', is the achievement of a global interoperability for the interchange of information between the three levels of the Spanish Administration. In order to reach this aim we must see interoperability from two different perspectives: physical and logical interoperability

1.4 Physical interoperability

It refers to the computer systems capability to communicate between them, that is to say, the establishment of a communication channel which allows information interchange between different computer systems at a different level. In this sense, the Corporate Network Service, of the "Dirección General de Innovación y Modernización Administrativa", works in accordance with the ERSDI regional strategy to spread the regional neutral node among the infrastructures of the Castile and Leon Government.

This regional neutral node must allow the communication between the SARA system (Administration Application and Network System) of the Nation, the Administration of the Community of Castile and Leon and rest of local Administrations in the region. Moreover some pan-European e-administration services are accessible in the Internet, but others, due to security reasons, are just accessible using the trans-European network TESTA, to which we would have access through the SARA system. This will provide to the Administrations of our region a channel for communicating and interchanging information with the rest of the European Union Administrations.

NOTES

[37] Strategic Modernisation Plan for the Public Services of Castile and Leon http://www.jcyl.es/scsiau/Satellite/up/es/Presidencia/Page/PlantillaN3/1144758965918/_/_/?asm=jcyl&tipoLetra=x-small

Concerning this, we can claim that most part of this physical interoperability has already been reached and, that the Castile and Leon Government owns a connection to the SARA network which allows us to enjoy some of the national services which will be mentioned later on this document.

To conclude, we must affirm that the telematic network spread should not be considered as an end, but as a means to reach the interoperable components to achieve some profits which will result in an improvement of the services provided to citizens and companies.

Logical Interoperability

It does not refer to the existence of a communication channel which allows the interchange of information between computer systems, it rather refers to "how" to achieve an information transmission in a coordinate way, that is to say, which language both systems should talk to achieve to communicate under certain conditions of security, quality and availability.

In this logical interoperability context we may mention two initiatives from the Castile and Leon Government: the Interoperability component with the MAP and the SOA Interoperability platform from the Castile and Leon Government.

Interoperability Component with the MAP (Ministry of Public Administrations)

The Departmental Innovation and Project Service of the Administrative Innovation and Modernisation Direction, has developed an intermediate gateway between the management headquarters of the Castile and Leon Government and SARA which simplifies the development of any application which may use the services thus provided.

The Castile and Leon Government holds this component from April 2006 and it allows it to communicate with the Spanish Tax Agency (AEAT), the General Treasury of Social Security (TGSS), the General Department of Police (DGP) and the National Statistics Institute (INE) using the SARA network of the Ministry of Public Administrations. Nowadays the photocopy omission services (SCSP) are being used, namely:

- Address information verification Service (SVDR), from the DGP.

- Extended Address information verification Service (SVDRE), from the DGP.

- Identity information verification Service (SVDI), from the INE.

- Identity information consultation Service (SCDI), from the INE.

- Change address communication Service (SCCD), experimental.

- The current payment services offered by the TGSS and the AEAT, although being proven and integrated with the interoperability component, are not in production due to some changes done in the authentication policies.
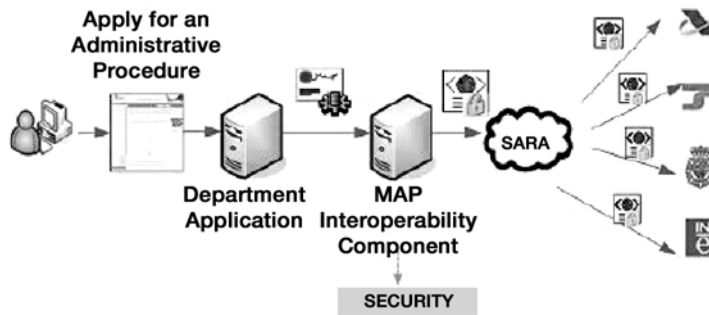
Figure 1. Interoperability Component

When any Council wants to use one of these services, its applications will have to communicate[38] with the Interoperability Component with the MAP, this component will verify that the civil servant running the application is authenticated thus allowing him to use such service.

The Interoperability Component with the MAP will send every request for information to the SARA network electronically signed due to security reasons, and every operation done will be stored[39] in a database in order to allow the trace of interchanged information. This database could be consulted when required.

SOA interoperability Platform of the Castile and Leon Government

The Corporate Services and Computer Infrastructures Service of the "Dirección General de Innovación y Modernización Administrativa" works in the study and implementation of a corporate SOA (Services Oriented Architecture) platform to achieve interoperability between the different computer systems of the Castile and Leon Government, and with the other region Administration systems, to join efforts for citizens profit and to achieve the transparency and simplification, the aim of all these strategic lines.

The Castile and Leon Government, according to the strategy established by the IDABC Programme[40], aims to create a secure and reliable communication platform for data interchange between Administrations and wants this interchange to agree with the XML vocabulary and schemes specifications.

The interoperability platform aims to guarantee the cooperation principle in the use of electronic means and the principle of technological neutrality, both mentioned in the Article 4 11/2007 Act for the electronic access of citizens to Public Services. The task of the interoperability platform implement project is based on three fundamental guidelines:

NOTES

[38] The interoperability with the MAP component has an interface for the connection of the applications of the Castile and Leon Government based on Enterprise Java Beans (EJB), but this resource is planned to be offered through Web Services soon.

[39] This database will store SOAP signed requests, that is to say, with the XML tags of the WS-Security Standard.

[40] DECISION 2004/387/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 April 2004 on interoperable delivery of pan-European eGovernment services to public administrations, businesses and citizens (IDABC). http://europa.eu.int/eurlex/

- Simplify: to simplify will allow us to change from an application interconnection model N*(N-1) to a centralised and, hence, simple, manageable and secure model.

Normalize: it aims to share and consume always in the same way, according to some standards and the technological neutrality principle. Thus, every time a service is to be used it would be known where to access and which steps to take to enjoy it. To achieve it, a change in the distributed system technologies must be taken, from those models based on RMI or CORBA, to an implementation based on Web Services (WS) and organized according to a SOA architecture. Thus, the platform will be based on XML, SOAP and the WS-* market standards.

- Security: it will be centrally managed and applied at a security control point, known as gateway, and also on Web Services clients. The Security policies which a certain service may need will be defined by the organism responsible for the data used by such service; aiming, in any case, the maximum guarantee of security and availability according to the Article 9 11/2007 Act related to the accordance with Personal Data Protection Act, Organic Law 15/19914, de 13 de diciembre, de Protección de Datos de Carácter Personal (LOPD) of December 13(LOPD) and its development regulation15. To achieve this in critical cases, security will be applied at two different levels: on the one hand at a protocol level, which will allow to create a confidential channel for the XML messages of SOAP requests to be hidden when travelling from a server to another, and using the server certificates by the Fábrica Nacional de Moneda y Timbre (FNMT)16 (the Spanish Mint); on the other hand, we will apply security at a message level, using the WS-Security standard to sing and encrypt the SOAP requests when necessary, component certificates issued by the FNMT will be used for this aim. In the future we expect the SOA platform to support the WS-Policy standard to define and share our security policies.

Besides simplification, normalization and security guarantees, the SOA Interoperability Platform from the Castile and Leon Government will allow us to attach adjuncts and to route and conversion of XML messages. It will also protocol conversion but, in this sense, Castile and Leon Government decidedly supports the use of Web Services as a means to reach technological neutrality. From a technological point of view, the SOA interoperability platform will be composed of:

- A service catalogue (UDDI), used as a directory, and available both from the corporate network and the rest of interadministrative networks. This catalogue will of interadministrative networks. This catalogue will include a list of telematic services availables, responsible organism, connection mode, required security policy, etc...

- An integration bus (ESB) responsible for the virtualization of the accesses to final services and the conversion and routing of XML messages when necessary. Every access to the corporate services will be centred in this component, which will allow to avoid scattered environments and to reach a model where centred accesses will guarantee some simplicity in security and management.

- A point (Gateway) where security policies will be applied, and responsible for the validation certificates combined with the @Firma 5.0 program, the decryption of requests, validation message signs, extraction of credentials from certificates, authentication and authorization of access using a directory service (LDAPv3).

The following figure shows the complete model:
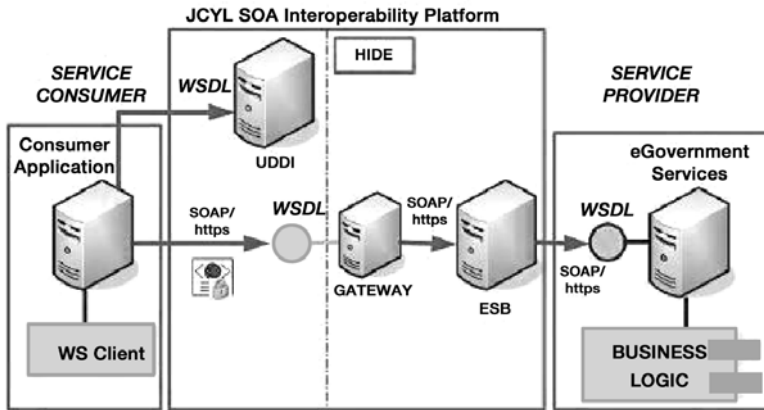
Figure 2. JCYL SOA Interoperability Platform

This platform empowers us to offer our services both to Community Councils, Autonomous Organisms and other entities belonging to the Castile and Leon Government, and to Town Halls and Provincial Councils of our Autonomous Community, this will create an interoperability framework also open for the use and sharing of services with the National General Administration and the European Union.

Taking into account the concept of interoperability as a multidimensional reality, as it has been seen in the IDABC Programme and the 11/2007 Act, we may claim that our interoperability model supports the technical aspect, by means of communication networks, sharing information systems (UDDI, ESB and Gateway) and the use of open standards WS-I, WS-Sec…

The semantic aspect will be granted avoiding the information meaning not to be lost during the process, this is achieved using our service catalogue which should clarify the meaning of any data transmitted using this platform.

The third aspect: organizational interoperability, it will be achieved reaching some agreements for the use and sharing of services resulting from the collaboration between the agents involved in these procedures.

Impact and Results

The creation a global interoperability model is not easy task. This decision should always be based on a technical and economical viability study which allows us to recover our investment as soon as possible. In our case, our interoperability model yields the following results.

- **Reduction in development time**

  Whenever an organization would be willing to use any feature hosted by a Web Service it would know exactly where to find such service, and how to consume it. This will result in a simplification of processes thus reducing development times and resulting in a benefit for developers and therefore, for citizens and organizations.

- **Technological Neutrality**

  Basing our model on a SOA architecture based in Web Services allows us to establish a layer independent from the underlying technology.

  Thus, interoperability among computer systems will always be achieved in a simple way, although certain platforms will favour specific uses and characteristics, particularly on security aspects.

- **A safer model**

  A centralised interoperability model allows us to avoid N*(N-1) environments where all computers were interconnected. Such models, as the number of systems increased, became unmanageable causing a severe security breach. In our case, security is always implemented, monitored and managed from a centralized point on the server side.

  This allows us to implement security always in the same and controlled way. Moreover, it helps us to plan and change security policies quite easily when necessary. Policies implementation on the server side will be done through the gateway and, on the client side through agents, handlers...depending on the available platform.

  This organization of information transmissions between computer systems allows us to meet the security features required by the Personal Data Protection Act (LOPD) and its development regulation.

- **e-Administration Boosting**

  The E-Administration Platform of the Castile and Leon Government consists in a group of modules which assure legal guarantees for the procedures that citizens and companies deal with the Administration using telematic techniques.

  Nowadays, many of these software modules have different connection interfaces from that of Web Services, becoming solutions difficult to manage.

  The following table shows some data concerning the most representative modules of the E-Administration Platform of the Castile and Leon Government (ADME).

Módulo de ADME	Datos de utilización
Telematic Record	280,000 request
E-sign platform	850,000 signs last year
SMS platform	145,000 SMS sent
Payment Gateway	131,000 procedures meaning an amount of 128,000,000 €

Table 1. Datos relatives a la utilización de los módulos software de ADME

When the whole E-Administration Platform use will be normalized, its interfaces will be based in methods implemented by Web Services and all the services will be jointly catalogued and published, its use will be a simpler task and therefore a definitive boost to the platform will be achieved, far overcoming data shown in table 1.

Indeed, the e-administration platform will become the first Big Customer of the Interoperability SOA Platform of the Castile and Leon Government, but it will not be the only one because, so far several Councils have already shown their interest in deploying their services in this platform.

Lesson Learned

Studies and experiences developed so far yield some aspects to take into account:

• Following a strict policy for the use of open standards, thus avoiding, when possible, the adjustments done by the different manufacturers of interoperability platforms.

• Establishing some limits on the size of the documents travelling through the interoperability platform. The XML documents processing is expensive and normal actions such as signing or encrypting documents, may mean large processing time and an exponential increase according to the document size.

• Security is the most critic and complex aspect in the development of a valid interoperability model at the administrations level. It is worthwhile to spend come time developing the appropriate libraries to guarantee confidentiality, authorisation, integrity and not repudiation of messages shared by computer systems.

• Boosting the creation of normalized schema models for validation.

Future Developments

In the development of an interoperability model in a region with the Castile and León casuistic, many things have not be done already. In this sense, we could highlight as future developments.

- **Implementation of the SOA architecture**

  Implementation of the necessary infrastructure for the interoperability SOA Platform of the Castile and Leon Government to be developed, thus guaranteeing the observance of basic security and availability measures. As long as availability is concerned, the necessary research is being carried out to redound the systems of the platform in a backup centre, thus achieving their 24/7[41] accessibility.

- **Development of libraries to apply security measures on the client side**

  As it has been already pointed out, security is a critic and complex aspect and the only way to counteract this complexity is normalizing the procedures of policies implementation. On the server side there is not such a problem because security is implemented in the gateway; but on the client side, and due to the varied casuistic of application servers and their versions is difficult to find an common model which allows us to guarantee security in a simple way. This is the reason why the use of standard security libraries for the Castile and Leon Government might the best solution.

- **Publication of the services which constitute the E-administration Platform of the Castile and León Government**

  The E-Administration Platform of the Castile and Leon Government is composed by a group of software modules; some of which have already been mentioned. These modules provide of legal guarantee to the telematic procedures. Many of these modules do not present yet a Web Service based interface and due to this reason the modification of such software components -to facilitate their use through the interoperability SOA platform of the Castile and Leon Government- should be considered as a priority. The services of the E-Administration Platform will be published and consumed through the interoperability platform as well as the other services developed by the Castile and Leon Government.

- **Assignment of a Web Service based interface to the Interoperability Component with the MAP and publishing it**

  Nowadays, the component of interoperability with the MAP acts as a client of the MAP Web Services, but the interface it presents to the applications of the Castile and Leon Government is not based on Web Services, it has been developed using Java technology and exactly, Enterprise Java Beans (EJB). This aspect could hinder its consume in the long run, so it is considered most suitable to work on the development of a Web Service based interface and to publish and catalogue them through the SOA Interoperability Platform, thus being consumed as any other service.

NOTES
[41] The achievement of a true 24/7 will depend on the availability of the machines where the original services are hosted.

- **Definition of a training plan**

  In order to achieve the success of such a complex project it is considered essential the definition of a training plan which will allow the different profiles related to the SAO interoperability platform to perform their tasks as good as possible.

  And finally, a literal transcription of the Regional Strategy for the Digital Information Society of Castile and Leon 2007-2013 and its declaration of intent: "the Government of Castile and Leon has the vocation to maintain a position of leadership in all the projects at national level which promote inter-operability at any level between the Public Administrations.

  These projects, in fact, represent a first class opportunity to start up computer processes and systems which directly affect theservice provided by the Public Administrations to their citizens".

The Catalan Interoperability Model

Ignasi Albors
Organization and Resources Director
Consorci Administració Oberta de Catalunya
ialbors@aoc.cat

ABSTRACT

Within Catalunya we have tried to think, plan and implant a common strategy in order to allow all the Catalan public administrations to exchange data and electronic documents, both between themselves and with other administrations and public bodies. This is a strategy that takes in technological, legal and organizational aspects and which has now begun to bear fruit.

This paper tries to explain this model briefly. We refer to our initiative as a 'model' because we think it is an approach to the aspects of interoperability that could be re-used profitably in many other situations.

INTRODUCTION

One of the indispensable aspects for achieving quality eGovernment products is that they are complete. This means not only offering to the citizens[42] the possibility of beginning an electronic procedure but doing it without the need for additional documentacion that must usually be provided through traditional rather than telematic channels.

Background Situation

Catalonia has some specific characteristics that makes this especially relevant:

- There is an important descentralization in competences between the three administrative levels (local, national[43] and state). This means each administration manages information about Catalan citizens that could potentially be needed by the other levels of administration in order to deliver their own services. For instance, when the Catalan government offers grants for house rehabilitation it needs information about the level of income or wealth, in order to be sure the citizen is living in this house and that s/he is the owner. Therefore, the citizen must prove these facts with documents. And the administrations have this kind of information. Traditionally, the usual way is that the citizen collects all the documentation necessary to receive the grant. This is a key element that must be changed if the Catalan administration's final aim is to improve the relationship with the citizens.

- On the other hand the Catalan public administrations are very heterogeneous. First we find the Generalitat de Catalunya, a mature organization from the technological point of view, managing an important competence framework with internal entities focussing on the eGovernment deployment. It's a big organization with a big budget and a defined strategy. And then we find the local administration, a heterogeneus set of 946 municipalities, 41 county councils and 4 provincial diputations. One statistic to illustrate their differences: there are 749 municipalities with less than 5,000 inhabitants and only 10 over 100,000.

- This irregular distribution of the population of the Catalan territory means that the majority of the Catalan municipalities cannot invest in electronic administration solutions.

These, among other things, are the reasons why the Catalan public administrations have been working together for years because by adding their efforts, they would be able to guarantee a certain cohesion between them and that the quality of the public services they offer to any two citizens, wherever they live, would be similar. And therefore the Catalan administrations (the Catalan government and the Localret Consortium, representing the Catalan local administrations) and the Catalan parties in 2001 signed an Agreement in the Catalan Parliament, to define a list of actions to advance in the eGovernment field.

The Catalan Interoperability Model

One of the aims to the 2001 Agreement was the creation of the Open Administration of Catalonia Consortium (AOC)[44] This is a public body created by the Catalan public administrations (Generalitat de Catalunya[45] and Localret Consortium[46]). Its mission is to collaborate with the public administrations in adopting and developing policies to enhance public services through motivating and promoting initiatives, developing products and managing services based on information & communication technologies.

We try to achieve that mission by working in three strategic branches of activity, with a clear vocation of service and trying to advance the future needs that we can foresee in the current legal framework.

- Interadministrative collaboration services, aiming to strengthen the information exchange by telematic means among the public administrations in order to improve their own efficiency and effectiveness as well. That means promoting the information systems of the Catalan public administrations interoperability (IOP). This set of services seeks to make it unnecessary to call the citizens to contribute to give creditative documents if the administration or public sector already has them, thus ensuring the observance of data protection legislation. This way could reduce time and costs in interadministrative communications and procedures.

NOTES
[42] In this document when I refer to the 'citizens' I am refering in general to the citizens, companies and organizations. So, I am refering to the users of the services the administration offer.
[43] In this document when I refer to 'national' field I am refering to Catalonia; when I refer to the Spanish field I'll refer to 'state'.
[44] www.aoc.cat
[45] www.gencat.cat
[46] www.localret.cat

- Common electronic administrations services, promoting the reusability of the eGovernment solutions.

- Identity, eSignature and digital preservation, promoting security and offering trust in the Internet use.

After some years offering electronic transactions by telematic means the Catalan administrations are aware that if they cannot avoid the need for the citizen to travel to an administrative office (to begin a procedure or to add documentation) the quality of the service and its mass uptake will not be achieved. For these reasons the Catalan administrations, together with the AOC Consortium, have defined a common strategy that allows them to face the IOP challenges successfully, underlining the capability to spread to all the public bodies and so to extend this solution to a lot of users, going beyond the typical examples where only two entities exchange information, and achieving a generic model for all the public administrations.

All the experts say that IOP projects must be faced from different perspectives. Usually they talk about the semantic, technological and the legal-organizational ones.

The Iop From The Technological Point Of View

First we planned the development of a technological platform working as a node, joining from a central position the complete set of Catalan administrations needs; between themselves and with others bodies (the Spanish administration, professional associations, public registers, ...). This platform, called the Interadministrative Collaboration Platform (PCI in Catalan), has been running since 2006 and is managed by the AOC Consortium and has the following technical characteristics. It aims:

- To offer a generic messenger for all the services.

- To control the access with authentications and authorization.

- To allow uniformity in the development of the services.

- To guarantee the security of the transactions.

- To offer tools to manage the traceability and audits.

- To guarantee the legal mechanisms to get the information.

In 2007 the Generalitat de Catalunya developed its own platform, called the Integration and Administrative Collaboration Platform (PICA, in Catalan) to integrate the corporative applications and improve the performance when the exchange of information is carried out within the Generalitat systems. This platform has been working since November 2007.

It is necessary to underline that both platforms have been developed with the same technology, that they are connected and that the catalogue of services is syndicated on the Electronic Data & Documents Catalogue, which forms the offer of services on exchanging electronic data & documents. Today (May 2008) this catalogue is formed by:

In the Spanish administration field:

• Tax Agency.

• Social Security.

• Police.

• Spanish Institute of Statistics.

In the Catalan administration field:

• Social Service Departament.

• Catalan Institute of Statistics.

In the local administration field:

• Municipalities (municipal census).

• Diputations (municipal census).

In the professional associations field:

• Catalan Architects Association.

• Barcelona Technical Architects.

The Iop From The Legal-Organizational Point Of View

To allow data and document exchange it is also necessary to define a legal architecture that ensures first, beyond the data protection legislation, the defined requirements set by the issuer[47] are acomplished, as well as an organizational scheme that allows the managing of a big number of players in the different roles (issuer or requester) of the IOP services offered.

To get it the Catalan public administrations strategy is based on simplicity. They have built another global agreement for all the Catalan public administrations, the IOP Framework Agreement (CMI)[48] signed in October 2006 by the Catalan government, the Localret Consortium, the city of Barcelona and the AOC Consortium. This agreement establishes:

• That the Generalitat de Catalunya offers to the Barcelona Council, as well as all the local authorities that adhere to the CMI, the electronic data, documents and certificates related to the citizens that it owns and that are needed in their administrative procedures.

• That the AOC Consortium could sign, representing all the Catalan public administrations, agreements with other bodies[49].

NOTES
[47] Issuer' is the entity that manages the citizens' data and offers it to other bodies.
[48] http://www.aoc.cat/index.php/ezwebin_site/content/download/718/3874/file/conveni_marc_interoperabilitat.pdf
[49] In this sense, the AOC Consortium has signed agreements with

So the technological scheme based on simplicity is reproduced to define the legal and administrative way, simplifying the access and the use of these contents for any public bodies. As a conceptual idea the sketch of the defined Catalan IOP model could be similar to the synapsis, the neuronal communication. The following figure tries to show this idea: there appear some technological nodes (PICA on the Generalitat side, SARA on the Spanish administration side, and PCI as a central node) allowing the simplified and direct access to the data required.
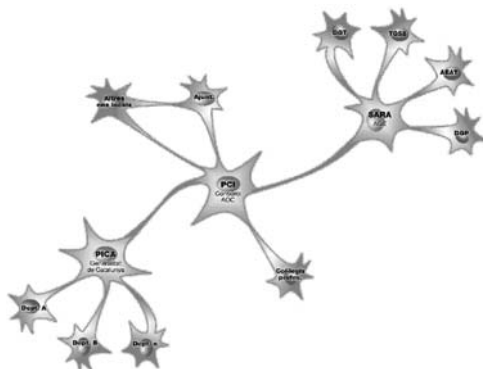
Our access to electronic data & documents are offered in two ways: individual queries or batch queries, and both can be activated by a public employee or by an application. The Generalitat de Catalunya has an intranet and this is what their public employees use to access the individual queries to the IOP resources. In the local administrations the situation is different and it was necessary to build a global solution: since 2003 the Catalan administrations (Generalitat de Catalunya and municipalities) has an extranet, called EACAT[50], managed by the AOC Consortium, to send electronic transactions between themselves, with an electronic register and signature as well. Now, EACAT is the place offered to the Catalan local public employees in order to reach the IOP range of services delivered by the AOC Consortium.

www.eacat.cat

The Iop From The Semantic Point Of View

At the semantic level the required needs, the search modality, must be adapted to the information and data content on the issuers applications.

This work needs an 'ad hoc' approach and analysis, and cannot be simplified and generalised as much as the technological or organizational themes, because each issuer builds and structures the information according to its own needs. The AOC Consortium must adapt to them and work to be able to offer this information to the rest of the administrations.

What Are The Lessons Learnt?

That the conceptual, implanting and exploitation processes to an integral system like this are complex, slow and that the results need a long time to appear. So, for this reason, it is necessary to have a lot of patience and perseverance because we must involve a big number of players, with their own rhythm and needs. But we think that if you want an outcome beyond an occasional case or a test, which could offer you a complete solution for exchanging data among administrations, the only way we find in Catalonia is the one that I have been trying to explain here.

What Are The Next Planning Steps?

Today the Catalan administrations and the AOC Consortium continue working to add new public entities that want to offer their data and documents to complete the Catalogue.

Today the AOC Consortium has signed agreements and is finishing technological projects with:

• The Catalan Notaries Association.

• The Catalan Industrial Engineers Association.

• The Council of the Catalan Industrial Technical Engineers Association.

We have also begun studies to promote the IOP with the Catalan information systems with:

• The Traffic General Management.

• The Property Register.

• The Commercial Register.

• The Catalan Technical Telecommunication Engineers Association.

Within the Catalan Government, the Office for the eAdministration Development, is working to allow data access from:

- The Catalan Employment Service.

- The Cooperative Register.

- The Laboral Society Register.

- The Catalan language level certificates.

Today a hundred Catalan public bodies have registered with the CMI. Our next aim is to increase the number of users as well the number of products that complete the Catalogue. To do it the AOC Consortium, with the collaboration of the Catalan administrations, has developed a data base called the IOP Map that allows us to get the information about the administrations' needs in order to get information managed by others by an empirical way, not by mere suppositions, and then we prioritise the planning.

Nevertheless we cannot forget that our aim is to go beyond the data exchange through electronic means and try to construct the systems as a step to allow the integration of electronic procedures between different administrations.

Where Are The Benefits?

To facilitate the integration of any public body in the Catalan IOP system by offering access to the complete set of offer services (if this body complies with the requirements fixed by the issuer entity).

To simplify the technological and organizational access to these services. Only a signature of conformity to the CMI and an EACAT access is needed to reach the Catalan IOP system services on offer.

We must remember that the public employees have, as a final objective, to offer a service to the society. The main beneficiaries of the model we have created we would like to think are to the citizens themselves in terms of saving time, and therefore, money, and providing a feeling of a better public service.

Identity and Residence Verification Data System

Nimia Rodríguez Escolar
Ministry of Public Affaires
Madrid, Spain
nimia.rodríguez@map.es

Jose A. Eusamio Mazagatos
Ministry of Public Affaires
Madrid, Spain
jose.eusamio@map.es

ABSTRACT

The Ministry of Public Administration of Spain (MAP), in order to stimulate the eAdministration, is promoting horizontal services to simplify administrative procedures.

The Identity and Residence Data Verification Systems for Spanish citizens (IRDVS) is an example of this type of initiative. The aim of these systems is to remove the paper photocopies of the national identity and residence documents usually requested to the citizens in the majority of the administrative procedures. This procedure is being replaced by a paperless electronic request to the IRDVS, with the same legal value as the traditional identity documents.

KEYWORDS

Interoperability as the key enabler for interregional cooperation
Egovernment, EAdmistration, Interoperability, administrative simplification

Reference Background

Since 1992, the Spanish Law 30/92, LRJPAC, in its article 35.f, considers the right of citizens to not present in administrative procedures documents which are already in power of the Administration.

However such basic documents as a photocopy of the national identity document or the certificate of residence are still being requested for the majority of administrative procedures. It is considered that the number of photocopies of identity accrediting documents Spanish citizens present annually for administrative purposes adds to more than four million.

Likewise, at least three million citizens change their legal residence address every year. In terms of Administration procedures, this means the issue of 10 million certificates of residence requested by citizens to justify their new residence.

Taking into account these facts, in May 2006 two Royal Decrees (RD 522/2006 and RD 523/2006) were published.

Their goal is to eliminate the request of paper photocopies of identity documents and the obligation to ask for the certificate of residence as a proof of the citizen's home and residence. The decree's scope only implies the national Administration, not to the local or regional ones.

Since that moment, the Identity and Residence Verification Data System (IRDVS) began to be designed, and the orders PRE/3949/2006 and PRE/4008/2006 were written. These orders lay down the technical configuration, characteristics, requirements and access procedures of the IRDVS. The publication date of these orders coincides with date the system became operational.

IRDVS is operative since the 1st of January, 2007. Since that moment the Spanish Administration has to check the data of the identity and/or residence of a citizen through IRDVS. These consultations are made with maximum guarantees of safety and by preserving the privacy of the data.

Project Description

IRDVS allows public organisations to check automatically, the data of identity and/or residence of the citizen involved in administrative procedures. To confirm the veracity of the data of identity, the system is communicated with the Directorate-General of the Police (DGP) and for that of the data of residence, with the National Statistical Institute (INE). These are the national organizations that have the competencies in those issues.

Goal

The fundamental aim of IRVDS is to remove the citizen's obligation to present photocopies that accredite their identity and official residence in all the administrative procedures.

Other sub-goals of this system are:

• Improving of services provided by the Civil Services to the citizens, saving them time and administrative procedures because the number of documents that they have to provide is reduced.

• Increasing of the quality of the data avoiding falsifications, bad readings or errors, since the data are checked directly by the competent organisation against the real sources of data.

190

- Reduction of the volume of the administrative files with the lessening the documentary load that shapes the file.

- Improvement of the internal effectiveness of the public Organisations, improving the procedure of its files.

- Increasing the organizational interoperability among the different departments and organisations of the Civil services.

- Simplification of the administrative procedures.

Technology

Two fundamental concepts have ruled the design and implementation of IRDVS: the interoperability and the re-use of systems.

IRDVS has been built taking into account several basic services that were available at the time of its design.

In that way, IRDVS mainly uses services provided by the multi-PKI validation platform (@firma); services of the Time Stamp Authority platform (TSA), and the specification of messages defined by the SCSP project - message for data transmissions among Administrations.

On the other hand, to check the identity of a citizen or to obtain a home address, the IRDVS makes requests to the DGP (Spanish Police Department) or the INE (National Statistics Institute), the competent organisations able to provide that kind of information.

So, whenever an organisation wishes to check some citizen's data, at least five systems come into play: IRDVS, @FIRMA, TSA, DGP and INE. Logically, each service has its own technological infrastructure, and one of the challenges of IRDVS is to guarantee the interoperability and technological independence of all of them.

For that reason, the current platform of IRDVS is defined as a Service Oriented Architecture (SOA) based on the following elements:

- Web Services specifications based on WSDL.

- Use of XML documents to exchanged data among different services involved in the system.

- Web Services electronically signature through XMLDsig.

- Establishment of secure communication channels between the participants through SSL protocol.

- Use of electronic certificates.

- Use of Time Stamping Services (TSA).

Functional Description

The execution of IRDVS, implies the realisation of the following operations:

- The citizen fills in a form where he gives its consent to the administration to consult its personal data of identity or residence. This consent substitutes the corresponding paper document that credits that citizen's personal information about her identity and residence place.

- In the course of the administrative procedure, the public organisation connects with IRDVS to consult the data of identity or residence place of the citizen. For that:

    - The public organisation fills up the data necessary to make the consultation and signs the request that it is going to make to the system. In this way the system shows evidence of the author of the consultation.

    - IRDVS checks the validity of the signing of the received request through the multi-PKI platform @firma.

    - IRDVS checks if the author of the request has the rights to access this data (Access Control to the system).

    - To show evidence of the moment when the public organisation makes the request, IRDVS uses the TSA system for stamping the time when the request was received.

    - The system leaves a signed register of the received request, the origin of the latter, and the moment of the consultation (stamp of time).

    - IRDVS makes the request of identity data or residence place to the DGP or INE according to the case. This request is signed by the system.

    - IRDVS receives the answer generated by the DGP or INE and checks its signature and the validity of this certificate.

    - IRDVS leaves register of the request and the answer made to the DGP or INE.

    - The answer for the public organisation is generated by IRDVS and it is also signed.

    - IRDVS registers, signs and stamps the time the answer is returned to the public organisation.

    - The public organisation receives the answer and continues with its procedure.
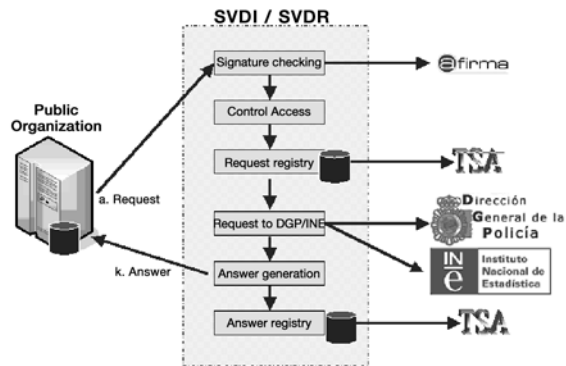
Figure 1. Functional Description of IRDVS

Functional Characteristics

Access to IRDVS

The public organisations can make the consultations to IRDVS, through the administration intranet (SARA), in two ways:

• **Automatic consultations**: the system sets out Web services which will be used by the applications of administrative procedures to confirm the data of identity of a citizen or their place of residence. This type of consultation facilitates the automatisation of these verifications in the administrative procedures and increases the interoperability among administrations.

• **On-line consultations**: for the case of organisations that cannot make use of the automatic consultations, an application web is provided furthermore. After filling in a form with the data of the citizen, the system will go on to consult its data of identity and/or residence. This type of consultations only can be made by public employees duly authorised. This users will also sign each of the consultations made.

Request security

All the request will be made with full guarantees of safety, confidentiality and data protection:

• All the requests will be signed (XMLDSig) with electronic certificate (X509 v3). In case the consultation is made automatically by an implementation that forms part of an administrative procedure, the request will be signed with the electronic certificate of software component. In case the consultation is made through the application web provided by this system, the public employee will have to authenticate himself for accessing the system by means of a personal certificate. Furthermore the employee will sign with his certificate, any request made to the system.

- IRDVS registers all the consultations made. It also identifies the author of the request (the public employee and/or the application) thanks to the electronic certificate used for authentication purposes. It also stores the moment when that request was made (stamped in time) and the purpose with which it has been made. The system guarantees the integrity of the exchanged message through the use of electronic signature. The system guarantees the confidentiality of the exchanged data. All the communications that are made among different organisations go over https protocol (SSL) and furthermore the network SARA provides, in its troncal section, data additional protection measures.

Delegated system administration

To facilitate works of registry, delete or update of users and applications that can use IRDVS, a delegated administration system has been developed. In this way each organisation can, independently, manage the users and applications that have rights for consulting the data of identity and residence place of a citizen.

Audit system

The system registers all the operations made. Each consultation of data of identity or residence of a citizen has a unique identifier. This identifier allows IRDVS to trace the sequence of operations carried out by the system. The basic information that can be retrieved regarding any request contains: the organization (user and/or application) that performed the request, the moment (date and hour) in which the aforementioned consultation has been made, and if the citizen has allowed the organization to perform this request.

Impact And Results

Impact of IRDVS in the Simplification of the Administrative Procedures

Among other goals, this initiative promotes, in relation to the administrative procedures:

- Simplification of the administrative procedures.

- Improvement of the effectiveness of the administrative procedure.

- Reduction of the volume of the files, saving role and space of storage.

- Improvement the quality of the data diminishing the falsifications and errors of transcription.

- Enable the citizen to put in practice their rights of not contributing with data and documents that Civil services already have.

To guarantee the citizen the removal of the contribution of accrediting identity and residence documents in all the administrative procedures, it is necessary to act in three fronts:

- All the administrative procedures must be simplified by analyzing the cases in which it is really necessary to request these accrediting documents.

- In those administrative procedures where the presentation of these documents is essential it has to be analyzed if the organisation has its own mechanism to obtain those data.

- In case having analyzed both previous points it is still necessary to contribute those documentation, and whenever the citizen of its express consent, the next step is to consult, by telematics resources, the citizen data through IRVDS.

Since IRVDS is in production, is the public organization the one in charge of checking the data of identity and/or residence place of the citizen involved in the administrative procedure. This consultation is made only in those cases in which it is strictly necessary, and only after obtaining the authorisation of the interested one.

The consultation is made with maximum guarantees of safety and by preserving the privacy of the data. Only in case the interested one does not give its consent to make that consultation, he have to contribute its corresponding accrediting identity document or certified of residence.

Innovation

One of the most remarkable aspects of this project is the political commitment it has received since its own conception. It is one of the first eAdministration services in Spain regulated by a Royal Decree (RD 522/2006 and RD 523/2206). Another notable aspect of this telematic service is that it has managed to overcome wide organizational interoperability issues within the civil services. This interoperability happens in two senses:

- With the organisations suppliers of data, that in this case comes from the Spanish Police Department (DGP) and the National Statistics Institute (INE).

- With the consumers of that information (all the public sector organisations). By the end of June 2007, a total of 642 public organisations had already joined the system.

However, the innovating aspect of this system is not restricted to the political commitment and the organizational interoperability of the public sector. Furthermore, it is one of the first horizontal services that the MAP puts at the disposal of all the Public Administrations in order to facilitate the provision of electronic public services, in fulfillment with Law 11/2007 of Electronic Access of the Citizens to Public Services. In their relationships with the administration, citizens usually have to go from one office to another to obtain official documents. However, with the IRDVS and its law development, the exchange of information among administrations has been boosted, enabling means to avoid citizens to provide copies of documents of the own Public Administration.

Evolution

The evolution of this system since its putting in production is picked up in the following graphics. Since January'07 to May'08, the total number or request received was **2.485.263**.
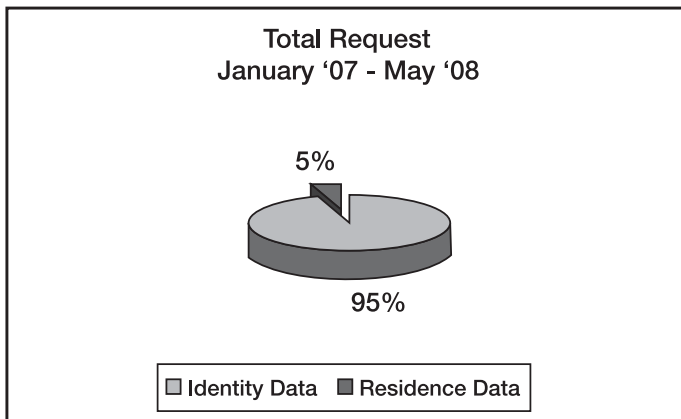
Figure 2. Total of request to IRDVS.
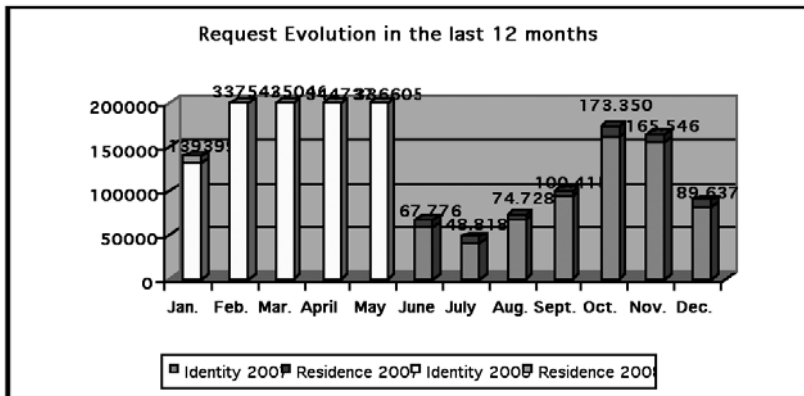
Figure 3. Evolution of request to IRDVS in the last 12 months.

Month	Identity	Residence	Total
January	131.666	7.733	139.399
February	327.127	10.415	337.542
March	424.559	10.487	435.046
April	331.795	12.942	344.737
May	320.114	16.491	336.605
June	60.261	7.515	67.776
July	42.493	6.325	48.818
August	68.541	6.187	74.728
September	93.651	6.764	100.415
October	162.386	10.964	173.350
November	156.569	8.977	165.546
December	82.871	6.766	89.637

Table 1. Number of request in the last 12 months

Results

This system presents the following advantages:

- Communications among organisations are rationalised. Where before relations had to be maintained bilateral, the relation is now maintained with a single speaker (this system) that is who will channel all the requests to the different organisations suppliers of data.

- It is constituted a single information point for the resolution of incidences so much techniques as of business.

- Access to the data is homogenised, by unifying the interface of access to them.

- The safety and confidentiality of the personal data exchanged by this system are guaranteed.

- A single point for the exchange of secured data is facilitated with organisations of the EU in case of arriving at agreements of collaboration of exchange of data among the different Member States.

- A unified control of access to the data of the citizens, provided that its consent is had and complying with the rules of protection of data.

For all these reasons, and in view of the good experience of use and answer of the current model of intermediation of data of identity and/or residence, it exists a large demand by any kind of public organisations (local, regional and national) to extend this model of intermediation of data.

Lessons Learnt

- The IRDVS is an example of a system able to deal with interoperability in its three levels: organizational, semantic and technological.

- It is worth to mention that the organizational interoperability was guaranteed thanks to the political support (through the new law regulation) the system had from its beginning.

- Furthermore, that organizational interoperability helps to simplify all the administrative procedures.

Future Developments

Taking into account:

- The actual demand of extending this system functionality.

- The international recommendations and initiatives about data exchanges and interoperability.

- The principal aim of this system, that is facilitating the citizen rights of not contributing any personal data that the Civil Service already has, the future of this project is to constitute an international and national platform for the citizen data intermediation for all the Public Administrations (National, regional and international).

From Extended Enterprise to Extended Government:
Regione Lazio Interoperability and Egovernment Point of View

Claudio Biancalana
Dept. of Computer Science and Automation,
RomaTre University
Rome, Italy
biancalana@dia.uniroma3.it

Dante Chiroli
Testing and Standards Software
LAit S.p.A.
Rome, Italy
dante.chiroli@laitspa.it

Claudio Pisu
eGovernment Projects
LAit S.p.A.
Rome, Italy
claudio.pisu@laitspa.it

Francesco Saverio Profiti
Testing and Standards Software
LAit S.p.A.
Rome, Italy
francescosaverio.profiti@laitspa.it

Fabio Raimondi
Testing and Standards Software
LAit S.p.A.
Rome, Italy
fabio.raimondi@laitspa

ABSTRACT

The widespread diffusion witnessed by e-Government services in recent years, has allowed the realization of important cases of administrative simplification, mainly due to the direct interaction between informative systems of administrations in A2A modality.

In the above scenario, a great importance is assumed by the concept of interoperability, intended as the set of technical rules necessary to define a common interface between

the administrations, which have the need to exchange information in A2A modality, and which allow to protect the technological choices already in existence, and the organizational autonomy.

The aim of the present paper is to illustrate the state of the art of the project initiatives prompted by the Regione Lazio, relatively to interoperability, with particular reference to the concept of Extended Government. Such concept finds its foundation in the definition of Extended Enterprise.

It has been massively used in project initiatives of the Region, with the aim of reusing the scientific research results in such field, mainly relatively to the design and realization of Knowledge Management Systems.

KEYWORDS

Extended Government, Maturity Model, interoperability, eGovernment, Knowledge Management System.

INTRODUCTION

In the late '90s, the concept of Virtual Enterprise (VE) for enterprise organizational models was introduced, where every business unit organization is connected to each other through a data transmission network, in order to explore market opportunities and cooperate, on a temporary basis, to better respond to business opportunities [1][2][3][4][5][6][7].

In other words, a Virtual Enterprise can be seen as a heterogeneous network for both enterprises and individuals with integrated cooperation, using ICT technologies and protocols for a specific business process. Over the years, a second model has been developed, substantially similar but based on more stable and long-term oriented agreements: this is the Extended Enterprise (EE) [8][9][10] model.

One of the most critic and important aspects in the implementation of an EE organization model is the single participant IT assets integration, realizing inter-organization processes (B2B) with knowledge sharing. To such aim, in literature, several frameworks are diffused: from SOA and EDA model for IT infrastructures integration to XML-based outlines (like RosettaNet) for B2B processes specifications, to models implementing integrated Knowledge Management Systems (KMS).

In our opinion, an organization model similar to EE has been also diffused to the Government level and can be recognized in initiatives such as IDABC[51], SPCoop[52], CNIPA "*Linee guida strategiche piano triennale per ICT 2009-2011*"[53], ICAR[54], iLazio2010[55].

NOTES
[51] http://ec.europa.eu/idabc/
[52] Centro Nazionale per l'Informatica nella pubblica amministrazione -http://www.cnipa.gov.it/site/itit/ In_primo_piano/Sistema_ Pubblico_di_Connettivit%C3%A0_(SPC)/ Servizi_ di_interoperabilit%C3%A0_evoluta_e_cooperazione_applicativa/
[53] Centro Nazionale per l'Informatica nella pubblica amministrazione - http://www.cnipa.gov.it/site/_files/Linee%20Strategiche%20CNIPA%2 02009-2011.pdf
[54] http://www.progettoicar.it
[55] http://www.esiig2.it/esiig2/pagina.php?cat=8

These initiatives are designed to realize the Administration to Administration (A2A) and Administration to Business (A2B) processes and are based on stable and deeply defined agreements.

Unlike the EE model, however, there is no focalization on business opportunity aspects but on a strong guideline for the simplification and the effectiveness of eGovernment Services.

In addition, the need to handle and query unstructured information has resulted in the gradual awareness of the need to adopt KMS based on semantic and user-modeling functions.

This high degree of similarity allows us to introduce a new definition to be used for reference to the concepts described so far: we will speak about *Extended Government* (EG) as a Public Administration context-oriented organization model of EE type.

Hence, the goals of this article are:

- More detailed definition of the concept of *Extended Governement*.

- Description of the initiatives started up by LAit S.p.A. and Regione Lazio in the fields of eGovernment and interoperability in terms of EG model.

- Description of future developments, with particular reference to the design of a KMS, whose development is strongly based on the parallelism between EE and EG model and on deep research in the field of EE.

DEFINING EXTENDED GOVERNMENT

We refer to *Extended Government (EG) as* an integrated unit of organizations, agreements, protocols and ICT resources able to support Public Administration to deploy a context-oriented model to build *Administration to Administration* (A2A) and *Administration to Business* (A2B) scenarios, to simplify and to improve the effectiveness of eGovernment Services.

By analogy with EE organization model, we can define main EG model features as:

- *eGovernment Service–driven* cooperation: A2A and A2B processes are always aimed at providing electronic government services to citizens and businesses, with the goal to simplify and make them more efficient and effective.

- Complementary: Administration exchanges with others only correct and complete data that it owns.

- Process Integration and Resource Sharing: particularly data, information and knowledge.

- Interdependence: Process Integration and Resource Sharing is carried out according to well-defined cooperation agreements.

In order to deploy the EG Organization Model, it is necessary to:

• Define a common *Governance Model* through theAdministrations of all participants.

• Define *Guide Lines* for every single participant IT assets integration. This problem is due to different technologies used by every Administration and the need to preserve both investments and Administration autonomy. For these reasons, it is necessary to define a technological infrastructure that guarantees interoperability regardless of the organizational structures and single participant legacy systems.

• Define a *Maturity Model*, which is a structured collection of elements that describe certain aspects of maturity in an organization, for example to provide a way to define what improvement means for an organization.

Regarding the first and second point, all regional projects (see following sections) use initiatives like IDABC, SPCOOP, "*Linee guida strategiche piano triennale per ICT 2009-2011*" by CNIPA and ICAR as a reference. As to the third point, we introduce a heuristic *Maturity Model* adopted in Regione Lazio to evaluate maturity degree in EG model deploying.

Extended Government Maturity Model

Extended Government Maturity Model (ExGMM) identifies 5 broad maturity/capability levels (see Figure 1):

Level 1 – Planned: In this stage an IT and Governance strategic plan are defined. Main criteria of this level are: vision definition and need assessment.

Level 2 – IT Integration Infrastructure Deployed: According to the strategic plan an IT integration infrastructure is deployed.

Level 3 – Institutionalized: A competence center is enstablished with the goal to minimize the cultural gap caused by the adoption of EG model and to define all the procedures and KPIs for management control.

Level 4 – Managed: at this level, using KPI, management can effectively control the AS-IS EG model.

Level 5 – Optimized: KPI are evaluated for model improving.

Figure 1. Regione Lazio Extended Government Maturity Model

REGIONE LAZIO EG VISION

LAit S.p.A. (as ICT in-house agency of Regione Lazio) is implementing an interoperability architecture with progressive technical and organizational complexity levels, as shown in Figure 2.

Obviously, to make the various Level Domains (Local, Regional, National and European) homogeneous, a good technical infrastructure is a necessary requirement.

So, it is important to transpose the National and European Standards and Guidelines in projects and activities, through a concerted organizational and technical governance.

By limiting the analysis to a mainly technical point of view, we will speak about the state of the art of architecture under development for the Regione Lazio, with a bottom-up approach, starting with the Regional Domain Level up to European Domain.
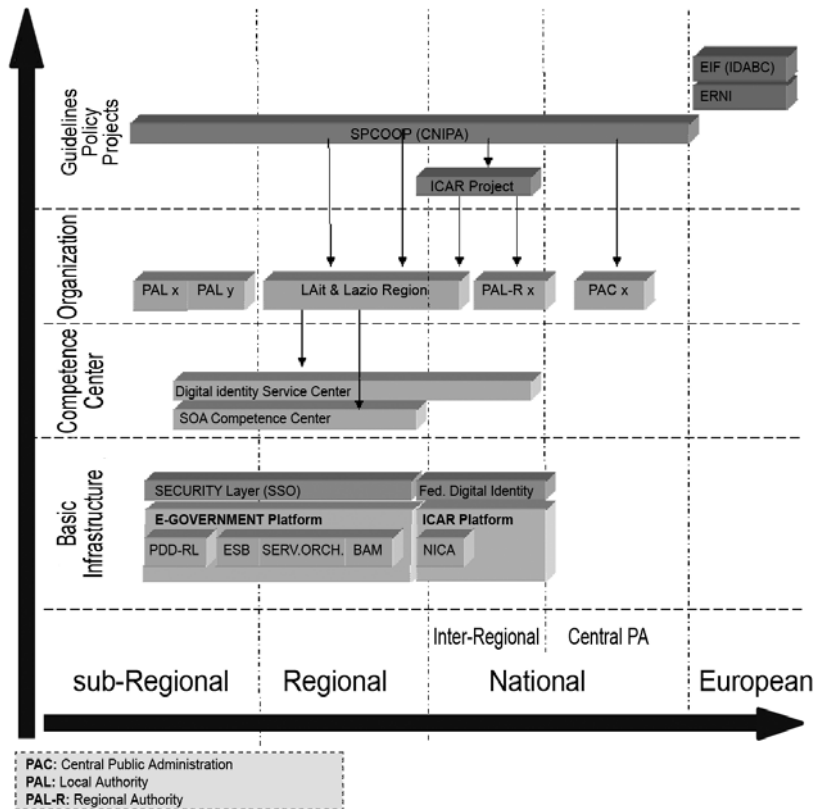
Figure 2 . Regione Lazio EG Architecture and Governance vision

203

REGIONAL DOMAIN

In order to achieve the complete software interoperability requested by CNIPA specification, the starting point is the deployment of SOA/EDA architecture. The Regione Lazio solution can be detailed in the following figure:
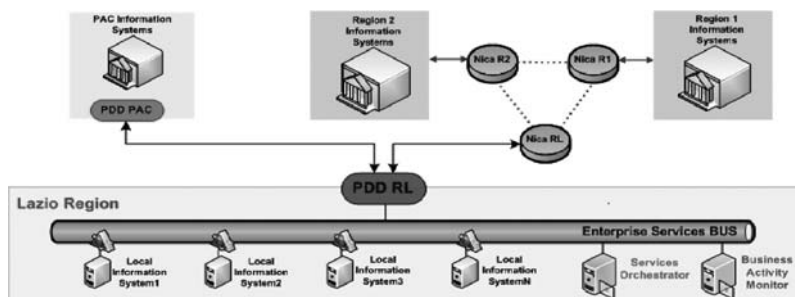
Figure 3. Regione Lazio EG IT Infrastructure

Porta di Dominio Regione Lazio

The first purpose of Regione Lazio infrastructure is to de-couple external resources from heterogeneous hardware and software within Regional Domain (such as legacy systems). The module Porta di Dominio Regione Lazio (PDD-RL) represents the only point of access for external resources (obtained by the externals PDD) and internal ones (obtained by Regional Systems), using Web Services consolidated technology, and implementing shared policies for security, logging and tracing, according to SPCOOP guidelines issued by CNIPA (see footnote 2).

Enterprise Service Bus

Once the separation of external from internal resources is completed with PDD-RL, the next step is to make the internal domain uniform, with an enterprise middleware that implements standardized interfaces for communication, connectivity, transformation, portability and security between various heterogeneous systems [11].

This is the task of the Enterprise Service Bus (ESB) module, which is the integration layer between existing internal IT assets of Regione Lazio Information Systems used to publish data for G2G and G2B processes on open standards, particularly Web Services and WS-* standards. Using ESB as integration layer it is possible to implement synchronous and asynchronous integration patterns. For this reasons, we can consider ESB as the entry point for SOA / EDA deployment in Regione Lazio.

Services Orchestrator

Orchestration consists of composing multiple services in order to create a new composite service. In our architecture, this component allows Services Orchestration: it consists of a Workflow Engine that can call and execute functions provided by the single services published on the ESB. The Workflow Engine adopts WS-BPEL standard to synchronize the interactions among different services: Business Process Execution Language (WS-BPEL) provides a standard way of describing business processes that are based on Web services.

Business Activity Monitoring

The Business Activity Monitoring (BAM) module has the responsibility to monitor, in real-time mode, all business process by user-defined Key Process Indicator (KPI). The BAM module is oriented to managers and business analysts, giving them useful tools to improve decision-making and optimize processes and e-services. This module is integrated with ESB and Service Orchestrator and can be operated through an user-friendly interface.

Access & Single Sign On Security Layer

Due to the complexity of the whole system, security side is crucial. So, the ASSO Security Layer was designed to achieve single access point for Regional e-Services and to support federated authentication request in the inter-regional domain. The layer of regional security has the priority to consolidate the system of Identity and Access Management, by making available authentication services through various authentication mechanisms (i.e. userid/password, smart card, etc.) and through the use of protocols such as WSS (security token X.509), SAML2.0 and XACML. The best solution spotted on the open source initiatives was identified on OpenSSO, which allows the use of open standards in open source, and ensures maximum interoperability, also in accordance with the specifications set by the ICAR project (see below).

SOA Competence Center

The SOA Competence Center is the focal point for aspects of infrastructure SOA and EDA, and is the benchmark for training to local and regional authorities on these issues. The competence center also has the task to organize and implement regional e-services within the infrastructure as well as maintain and upgrade the infrastructure. Using the tools described above (ESB, Service Orchestrator, BAM), the Competence Center supports local authorities to define business goals, to model business processes and to implement e-services.

Digital Identity Service Center

The Digital Identity Service Center manages flows associated with the life cycle of regional identity. It's a reference point for the insertion, update and deletion of digital identity and it is the organizational basis for federated identity management.

INTER-REGIONAL DOMAIN

Regione Lazio is involved in ICAR project, namely Interoperabilità e Cooperazione Applicativa tra le Regioni (System for e-Enabled cooperation among Regional, Local and National Administrations in Italy).

ICAR is present in the European database of best practices of e-government (e-practice.eu[56]),and is setting up and testing the shared technical infrastructure for applications cooperation among Italian regional authorities, following the national standards defined for development of the so-called Sistema Pubblico di Connettività e Cooperazione, SPCoop (Public Connectivity and Cooperation System). ICAR introduced the concept of SPCoop private network, an intranet of public regional administrations that have arranged inter-PA processes for organizational reasons, according to SPCoop guidelines.

Nica

Because of the need to interconnect the various SPCoop Private Networks while ensuring adherence to the SPCoop specifications also incommunications between parties belonging to different networks, a new infrastructural element, called Nodo di Interconnessione per la Cooperazione Applicativa (NICA, Core of Inter-regional Interoperability) was introduced. Its features are similar to PDD-RL, making it the single point of access for both the regional domain and another regional federated domain.

Federated Digital Identity

Normally, the systems for digital identity have a territorial basis. This module overcomes identity domains, whose distance can be bridged through a federated system. To achieve this result, open standard (SAML2.0) designing must be used and a reference implementation must be developed by the ICAR project community, so that interoperability can be tested in the digital representation of identity.

NOTES
[56] http://www.epractice.eu/cases/1937

Architecture Deployment in Local Authorities

The resulting architecture described in the previous paragraphs raises an issue. The architecture implemented at regional level can be extended to local authorities to achieve full interoperability within the regional domain, but it is important to identify the best architecture of the right size.

The answer is to make the regions the reference point of local authorities and coordination node to other Regions. To achieve this, the most advantageous solution is the hybrid architecture, which provides the use of a PDD for local authorities that can manage and use it, and PDD-RL for all other entities.

NATIONAL DOMAIN

At national level, the CNIPA issued a set of technical documents as a reference for infrastructural e-service development (SPCoop). These documents were written by 120 peoples from various local and central administration authorities, and represent Italian reference for all interoperability plans and projects.

A significant example is the ICAR project, developed by CNIPA under the second phase of Italian e-Government, which will represent the engine of convergence of regional projects of cooperation implementing SPCoop. This way, the systems approach adopted will allow a unified and integrated back office central and local government while preserving autonomy.

Even on the basis of the experience and the results of SPCoop, on February 2008 CNIPA issued strategic lines for the period 2008-2011, providing lines of action for the development of ICT in public administrations. The document is the result of consultation with the regions and local authorities, with reference to European framework. Among the macro objectives of e-government to improve PA performance, interesting lines of action are the two below:

• Implementation of solutions for interoperability and integration between databases and services.

• Adoption of Knowledge Management Systems (KMS).

Regarding the first point, the SPCoop together with the standardization of interchange content and the cooperation domains, constitute a basic infrastructure for the integration of databases and government services. To achieve this, catalogues of databases owned by administrations should be published, including descriptions of data and services, uniform and comprehensive, based on ontology, defined rules for shared reciprocal access administrations.

The integration and interoperability should not involve only information resources and information Public Central government, but also those of local authorities, with a multilevel governance. These national guidelines are covered by Regional projects.

Regarding the second point, improving performance necessarily requires a new and different way of working to provide fast and effective answers to the new problems of society, increasingly complex and rapidly evolving. We must develop the capacity to involve all relevant actors in this issue, to activate the right channels of communication, to acquire the necessary information to the analysis of large quantities of unstructured documents and stimulate the contribution and creativity of communities of experts. To support this new way of working, the government should gradually adopt Knowledge Management Systems (KMS) of new generation.

EUROPEAN DOMAIN

As described above, the Regione Lazio Infrastructure has characteristics of flexibility, scalability and interoperability and uses open standards. This is important in the medium and long term because the whole system must progressively enter a European context that is becoming more and more relevant. In particular, the development of the Regione Lazio solution is safe and aligned with European Interoperability Framework (EIF)[57] recommendations. This reference document on interoperability for the IDABC programme draws primarily the concepts of technical, organizational and semantics interoperability.

ROAD MAP TO EG MODEL

The architecture support to Extended Government described so far is being issued in accordance with an incremental plan. PDD in particular has already been issued in production, while all other components are being deployed. To give an indication about roadmap progress in terms of Extended Maturity Model Government we can say that Lazio Region is located at Level 2 of the MM.

CO SYSTEM EXPERIENCE

Regione Lazio is committed in a national project called Comunicazioni Obbligatorie[58] (CO) that connects Central Administrations, Regions and Provinces by a net with the goal to replace the old modes used by public and private employers to communicate hirings, modifications and ends of job relationships to Centri per l'Impiego (CPI), Enti Previdenziali and Ministero del Lavoro (MIL).

All services required for the project were developed according to SPCOOP guidelines, with particular reference to the use of PDD as WS Gateway. Regione Lazio participated in the CO System using its PDD. In the first five months, 1.570.570 service requests reached PDD-RL, as summarized in Figure 4.

NOTES
[57] http://ec.europa.eu/idabc/en/document/2319/5644
[58] www.lavoro.gov.it/CO
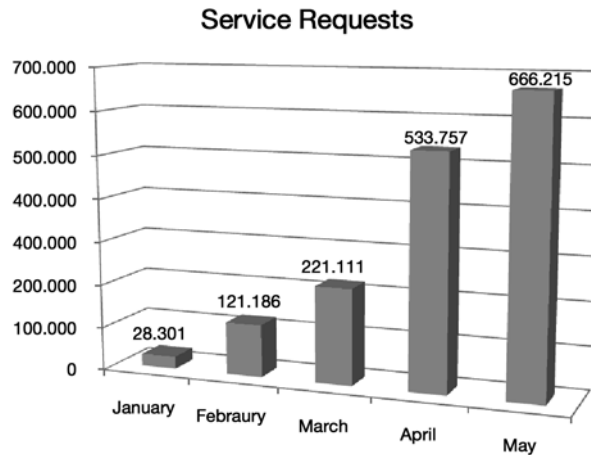
Service Requests

Figure 4. First five months CO System service request

LESSON LEARNED

Regione Lazio experience raises an issue: realization of A2A and A2B isolated processes leads to fragmented knowledge and to a loss of fundamental information used to integrate management relationship between Administration and citizens or enterprises. For this reason, LAit S.p.A. and Regione Lazio have planned a KMS design with basic concepts (see Section below) inspired both to EE model and EG model, in order to devolop research ideas in the EE field.

FUTURE DEVELOPMENTS

Industrial and research worlds are thus sharing the same views and aims, colliding towards a new web vision, where "knowledge" is no more a huge amount of (semi) structured text but is turning into a cloud of overlapping concepts, topics and domains.

At the same time, a better organization of the huge amount of information erupting from the stream of available technologies is needed.

To find the way through the plethora of information sources, differentiating in content, presentation and accessibility, a viable approach would be necessary to make these layers explicit, allowing users to recognize them as several possible manifestations of the same knowledge, and organize them accordingly.

It makes sense to move from single (and in-interoperable) specific services (blogs, wikis, forums, discussion groups and so on…) to huge collectors of information on a open and global scale.

Knowledge Management Systems' future (KMS, from now on) should provide the main intellectual stream of interests around which knowledge should be organized (and different services be offered). By adopting Semantic Web standards, KMS would be developed around ontological repositories of conceptual knowledge, which will be used as reference vocabularies for accessing contents of federated (or simply annexed) services and (socially) bookmarked web pages.

In this scenario, traditional services will still be reusable and will coexist with their new semantic counterparts, with the former being semantically annotated with respect to the ontologies adopted, and the latter natively supporting a semantic organization of their content.

The main principles of KMS should be:

• *Affordable setup*: no more heavy bulked Social Networks held by major company titans. As a normal web user can now start a forum or a blog using third party (often free) software, he should also be able to use a web host or a hosting service;

• *Accessible by (Semantic?) Search Engines*: in our vision, this is surely something related to the open nature of KMS, but it would gain some commitment from search engines, which will be able to improve quality of searches through proper indexing of published semantic annotations;

• *Scalable open architecture*: a given service may explicitly be built upon a KMS, committing to its ontologies and content organization. Viceversa, in an even more open view, independent services may be linked by a given KMS. This would allow users to tag the content of these services according to the oasis' reference ontologies, thus easily putting traditional (non semantic-driven) services immediately into practice. The same would be applied to standard web pages. People could write web pages directly connected to a KMS making explicit reference to its vocabulary, as embedded RDFa [14], or they could semantically bookmark an external web page (or annotate part of its content) against that same vocabulary.

One of the biggest (and most discussed) problems in the realization of the Semantic Web [13] was the difficulty in establishing consensus on domain representations. The major concern was about the natural resistance of companies and providers to commit to any kind of knowledge organization which could not reflect their inner nature and characteristics or simply properly address their specific information needs.

Also, the different cultures which must be considered on a World Wide scale needed to be kept into account, creating another obstacle towards ontologies seen as acceptable "shared reference vocabularies" in the Semantic Web. These fears, appear, at least in part, as dictated by and old fashioned way of thinking about knowledge organization. Most widely adopted ontologies contain now very simple descriptions of very specific aspects of a domain (or of reality, in general).

These ontologies can be easily imported in any more complex knowledge organization system, with no fear of generating unsolvable inconsistencies, while leaving the possibility of providing ad-hoc domain descriptions for addressing specific needs, by adding arbitrary concepts and relationships to the imported ones.

This approach guarantees a desirable degree of shareability of the collected data (at least, on its higher-level descriptive units) while preserving the intellectual independence in modeling specific scenarios and domains. Following this approach, KMS, while allowing for ad-hoc ontologies developed for their specific needs, should foster reuse of "standard ontologies", thus opening to external linkable services which have been developed independently from their suggested vocabulary, as well as enabling peer-to-peering.

ACKNOWLEDGMENTS

REFERENCES

[1] Katzy B.R., Dissel M.C., "A toolset for Building the Virtual Enterprise", Journal of Intelligent Manufacturing, Volume 12, Issue 2, pp. 121-131, April 2001.Panther, J. G., Digital Communications, 3rd ed., Addison-Wesley, San Francisco, CA (1999).

[2] Strader T.J., Fu-Ren Lin , and Shaw M.J.. "Simulation of Order Fulfillment in Divergent Assembly Supply Chains", Journal of Artificial Societies and Social Simulation. 1 . 2. March 1998.

[3] Goldman S. L., Nagel R. N., Preiss, K. "Agile Competitors and VirtualnOrganizations - Strategies for Enriching the Customer", Van Nostrand Reinhold, New York, 1995.

[4] Camarinha-Mathos L.M., Afsarmanesh H. "The Virtual Enterprise Concept", published in Infrastructures for Virtual Enterprises (Kluwer Academic Publisher), 1999.

[5] Sieber P., Griese J., "Virtual organizing as a strategy for the Big Six to stay competitive in a global market", Journal of Strategic Information Systems, n°7, pp. 167-181, 1998.

[6] Christie M.J., Levary R.R., "Virtual Corporations: recipe for success", Industrila Management, pp. 7-11, July-August 1998.

[7] Katzy B., Obozinski V., "Designing the virtual enterprise", Proceeding of ICE'99, 5th Int. Conf. On Concurrent Enterprising, The Hague, Netherlands, ISBN 0 9519759 8 6. 15-17 March 1999.

[8] Browne J. and Zhang J. "Extended and Virtual Enterprises. Similarities and Differencies". International Journal of Agile Management Systems, 1/1, pp. 30-36, 1999.

[9] Barbini F.M. and D'Atri A., "How innovative are virtual enterprises?" In Proceedings of ECIS 05, The 13th European Conference on Information Systems, 2005.

[10] Barbini F.M., "FairWis: a virtual organization enabler". Proc. of OES-SEO (Open Enterprise Solutions: Systems, Experiences and Organizations), Rome 14-15 September 2001.

[11] A. Saini, "Demystifying the enterprise service bus". Business Integration Journal, Business Integration Journal.Press, Dallas, September 2003, pp. 24-26.

[12] Castellano M., Pastore N., Arcieri F., Summo V., Bellone de Grecis G., "An e-Government Cooperative Framework for Government Agencies". IEEE the 38th Hawaii International Conference on System Sciences, 2005.

[13] Dijck P.V.. Themes and metaphors in the semantic web discussion (November 2003). Retrieved from: http://poorbuthappy.com/ease/semantic/

[14] Adida B., Biberick M. RDFa Primer. Retrieved from W3C: http://www.w3.org/TR/xhtml-rdf

Contribution by the members of the Technical and Scientific Committee

Contribution by the members of the Technical and Scientific Committee

Another important added value to the Summit has been given by the TSC members's contributions as regards the projects concerning the interoperability field.

The following are the papers presented by the members of the TSC of ESIIG 2: Flavia Marzano, Interoperability and eGovernment through adoption of standards; Michele Missikoff, a Brief Compendium on Interoperability in the eGovernment; Francesco Tortorelli, SPC- The Italian Interoperability Framework with services; Giulio De Pedra, Fabrizio Gianneschi e Giaime Ginesu, Exploitation of Digital Contents for the Public Administration; Silvia Archmann e Castillo Iglesias, Deploying the full transformational power of eGovernment.

Interoperability and Egovernment Through Adoption of Standards

Flavia Marzano
Una Rete http://www.unarete.org
Rome, Italy
flavia.marzano@gmail.com

ABSTRACT

Efficient public services are based on "traveling" data and do not need traveling citizens. "When people interact with government, they want to do so on their own terms.

They want high quality serviceswhich are accessible, convenient and secure. They do not necessarily want to have to understand how government is organized, or to know which department or agency does what, or whether a function is exercised by central and local government."[2]

Based on these concepts, this paper will show the importance and specify the features of standards needed in orderto grant interoperability which is the ground for an efficient eGovernment.

KEYWORDS

Interoperability, eGovernment, Open Standards, Open Format, ODF, OOXML, PDF, Standard ISO.

INTRODUCTION

In a modern vision of the relationship between citizens and public administrations, eGovernment and interoperability are the essential "tools" to assure a fully digital workflow without any need for the citizen to be involved in the intermediate stages of the administrative process. In particular interoperability is crucial whenever more administrations are concerned.

Which is the basic common notion beyond the concepts of interoperability and eGovernment? We can describe it by the expression: information through technologies. In fact all organizations need to exchange information; to do this, means of communication are needed, but if two subjects speak different "languages", communication is definitely-compromised. **A shared language of communication is the only way to ensure that the basic concept of interoperability is implemented**. A language is a collection of words and fixed rules, whose knowledge must be shared by communicating subjects.

This concept can be easily transferred to the large scale transmission of information (which occurs in the case of interoperating administrations) by changing the communication modes from spoken and/or written words to information and communication technologies (ICT) and in particular to internet. Like humans speaking different languages, ICTs, based on different systems (hardware and software), can not always interact easily and "understand" each other.

Internet itself consists of a complex set of "languages" that must be shared in order to allow information exchange and interoperability: **without a "common language" it is impossible to communicate and/or interact**, and that is the basic reason why establishing shared standards is a key issue in this context.

INTEROPERABILITY IN PUBLIC ADMINISTRATION

Interoperability is "the ability of information and communication technology (ICT) systems and of the business processes they support to exchange data and to enable the sharing of information and knowledge"[4], and in the light of the considerations presented in the introduction, it is especially needed in the context of Public Administrations.

Some essential features of interoperability in Public Administration must be:

• Seamless communication between actors.

• Efficient service delivery.

• Possibility of sharing content, data, applications.

• (Reusability).

• Long-term sustainability of software and of access to.

• Data.

• Independence from specific software vendors.

The above quoted European Interoperability Framework, besides requiring the adoption of these features, defines also a set of recommendations and guidelines for eGovernment. It is essential for all the European Public Administrations, at all levels, to understand and fully adopt these recommendations. According to the Draft document offered as a basis for EIF 2.0 "**there is widespread agreement on a number of points relating to interoperability**:

- The importance of standardization in procuring and building ICT systems.

- The importance of using open standards where possible to avoid vendor lock-in.

- The multi-dimensional nature of interoperability, and the need to consider all levels in building interoperability.

- Solutions, with increasing focus on achieving semantic interoperability.

- How expensive and difficult it is to retool ICT systems to work in ways that they are not originally intended to do.

- The complimentary nature of the respective roles played by Enterprise Architecture and Interoperability Frameworks in achieving interoperability.

- The importance of good governance of ICT and more generally of public services in achieving organizational goals".

However an interoperability framework is "not a static document and may have to be adapted over time as technologies, standards and administrative requirements change". (source: European Interoperability Framework for Pan-European eGovernment Services). This last statement is especially relevant to the still open issue of defining documents and data standards.

IDABC, conscious of the relevance of these issues, has been open to reactions and contributions to the EIF by whoever "sees interoperability as an effective means to provide better pan-European eGovernment services", inviting interested subject to provide feedback (until 22nd of September 2008).

OPEN STANDARDS

"**Open standards create interoperability**. A standard is a specification, a practice or a reference model which is used to define an interface between two or more entities such that they can interact in a predictable fashion (Walli, 2005). It is said that "the very best example of open standards is the Internet itself" (CED, 2006). There are two kinds of standards– de facto and de jure.

A de facto standard typically emerges as a result of a single vendor having an overwhelming market share or monopoly. De jure standards are produced by organisations and committees with established processes for adopting a standard. They are open in the sense that they are built in a public or "inclusive", consensus-based process and can be used by anyone free of charge" [5].

"A key benefit of open standards is that they foster interoperability, allowing disparate devices, applications and networks to communicate.

Such interoperability is critical to the development of network effects and the operation of Metcalfe's law. Metcalfe's law demonstrates that the value of a network increases as users are added to it; interoperability allows the full benefits of each addition to be realised. In some cases, the benefits can be enormous.

The National Institute of Standards and Technology has estimated that the lack of interoperability in information systems costs the construction industry more than USD 15 billion each year; the lack of interoperability in the supply chains of the automobile and electronics industries costs an additional, combined USD 8.9 billion annually."[5]

To ensure interoperability among Public Administrations open standards must be enforced. The above mentioned draft **for EIF 2.0** [3] states that "**Openness of standards or technical specifications is important for public administrations because of its relationship with interoperability, freedom and choice**:

- Openness lowers barriers to market entry, thereby widening the field to competition - leading to more choice, better quality and lower prices.

- Openness spurs innovation by allowing more talent to contribute ideas and advance the state-of-the-art.

- Openness strengthens the position of consumers vis-àvis their suppliers.

- Openness enables consumers to combine off-the-shelf products with custom-built products and turn-key systems.

- Openness facilitates interoperability through transparency.

- Openness enhances security through transparency.

- Openness ensure access to information and services, now and in the future, as it avoids lock-in situations, making such access dependent from specific products.

- Any Public Administration must be independent of any particular supplier in terms of having permanent access to and control over its own data. This naturally leads to the identification of a number of specific needs and organizational imperatives related to standards or technical specifications.

- Public Administrations, especially in the PEGS[59] context, need common standards or technical specifications to implement the interoperability of their processes, organizations and systems.

- The specifications being used have to be state-of-theart, in order to be compatible with the rest of the world and to reduce risks.

- Access to the standards or technical specifications has to inexpensive and easy and there should be no (cost) barriers related to their implementation so that a wide variety of products will be available on the market.

NOTES
[59] Pan-European eGovernment Services

- Public administrations must maintain positive control over standards or technical specifications that have been developed by and for public organisations (metadata, schemas, taxonomies etc.). For all of these reasons, the overwhelming desire of Public Administrations in Europe is for a clear migration towards openness. The European Interoperability Framework for Pan-European eGovernment Services defines the essential features that standards adopted in public documents must have in order to be consistent with open standards.

- The standard is adopted and will be maintained by a not-for-profit organization, and its ongoing development occurs on the basis of an open decision-making procedure available to all interested parties (consensus or majority decision etc.).

- The standard has been published and the standard specification document is available either freely or at a nominal charge. It must be permissible to all to copy, distribute and use it for no fee or at a nominal fee.

- The intellectual property – i.e. patents possibly present– of (parts of) the standard is made irrevocably available on a royalty-free basis.

- There are no constraints on the re-use of thestandard."[4].

STANDARD ISO

At present there are two standards ISO, defining rules tosave, store, distribute and edit documents that satisfy the above defined criteria:

- ODF (Open Document Format) – OASIS.

- OOXML (Office Open XML) - Microsoft.

The PDF standard is also ISO but it is especially devoted to documents that do not need any further editing.

The presence of two standards is obviously not an ideal situation especially for Public Administrations that must save, store, distribute and edit a large amount of documents of any kind, not only text files, but also videos, music, web pages, images,… and possibly retrieve it at any time, with any instrument.

Which criteria must be followed by Public Administrations in the choice of the standard to be adopted?

Should they choose to adopt both standards, which would mean to double costs at least for storage?

Should they choose one? But how and which one?

The main issue is not really technical but it involves political choices. Bob Sutor[60] has listed some of the main elements to be taken into consideration:

NOTES
[60] Bob Sutor: Chairman of the IBM internal Corporate Standards Advisory Committee and the Open Source Steering Committee.

- Not all standards are created by a community of independent stakeholders, as some people may have previously assumed.

- If intellectual property policies are not clear and comprehensive, significant questions exist over who can implement what in what way.

- There are no brakes on putting the wrong standards though some existing processes.

- Politics, and not just standards politics, has fully entered the process.

- Equilibrium, the need for having a balance of independent people considering a standard and not a majority of business partners, is out of control.

- In some countries with democratic governments, there is virtually no connection between "representation of the people" and votes on international standards.

- There is very little consistency from country to country in how voting decisions are made, which is their right, but some better common guidance might be appropriate.

However the studies comparing the two standards come to different conclusions

After approval of OOXML as a standard, Craig Kitterman(Microsoft) states in his Interoperability Community Blog:

"It is a great victory for supporters of document choice and flexibility and for those who prefer to use ISO standard formats.

It validates the need for additional document standards– for users not completely served by previously existing ISO standards.

Ratification also demonstrates that the global community is interested in ISO/IEC oversight of the maintenance and evolution of the spec for such a widely used format.

This long process has added tremendous value to the specification through improvements proposed by national bodies around the world and it is great to see the global community working together to build consensus.

I am very happy with this result, but our work continues –not just for Microsoft but for the entire vendor community.2 Bob Sutor: Chairman of the IBM internal Corporate Standards Advisory Committee and the Open Source Steering Committee.

We will be continuing to build on the work the community has been doing to improve interoperability between standards-based document format implementations through our Document Interoperability Initiative (DII)."

Open XML community [8] offers a different point of view:"Governments around the world are moving to include both Open XML and ODF as part of their standards policy.Choice and interoperability among open standards helps to ensure innovation can take place in an efficient manner."

In turn, the white paper [9] by Edward Macnaghten based on a technical comparison between the ODF and OOXML formats (Published on Free Software Magazine[61]) concludes: "Standards exist for interoperability, and office document format standards should not be different. The goal is that someone in country A working for company B using product C can interchange documents with someone in country D working for company E using product D without any thought as to what precisely A, B, C, D, E or any other letter actually is. It simply works. There is no need to worry if any single vendor would continue in the office suite business or not, as any other vendor could be used.

ODF was created using existing standards with this interoperability in mind, using long public consultation and design periods to achieve this. The benefits of this are evident when examining the resulting formats themselves. It has been implemented by a large number of office products and the list is growing.

OOXML was designed by a single vendor, Microsoft, with no extensive public consultation or design input. It was largely designed to co-exist with their legacy formats using their own products. The design of the specification is such that might happen if their own legacy closed binary formats were simply XML-ised—that is binary encodings simply converted to arbitrary XML tags.

Upon examining the formats it is difficult to ascertain any technical reason why Microsoft Office documents cannot be saved and interchanged using ODF with one hundred percent reliability. ODF has the features that will deal with all Microsoft Office's quirks, even ones like "footnoteLayoutLikeWW8". However, OOXML in its current state cannot handle any applications except Microsoft Office. It is my opinion that Microsoft peculiarities in OOXML, together with the fact the specification is over 6000 pages long, would greatly hinder the ability of other parties to develop products that would completely, or near completely, read and manipulate documents in that format and to the extent that it would render it practically difficult to work with as a universal standard."

Finally, it is worth indicating that Microsoft, in many different statements, has been suggesting to delay the choice on standards, waiting for the market to give a clear signal.

CONCLUSIONS

In many European countries the national legislation has already taken steps towards the adoption of documents and data standards, non only with the aim of fulfilling the above described conditions for interoperability, but also in order to make public documents fully available/readable/editable without the need to use a specific software and to buy any kind of license.

For instance in Italy, since 2004, a norm has been established forcing public administrations to publish public documents in at least one open format. But the issue of a verifying how many administrations are compliant and especially of enforcing compliance is still an open one (and this may be not just an Italian problem).

NOTES
[61] http://www.freesoftwaremagazine.com

The tendency to adopt standards is obviously positive, but the lack of a common European policy may easily lead to a situation in which not all countries adopt the same standard.

However interoperability is needed not only at the national level but also between different European countries, and therefore common guidelines should be defined at the European level. For this reason we strongly believe that any final decision on standards should be taken only after a thorough investigation by a multi-partisan European committee.

If we really believe that interoperability and an efficient eGovernment are commons European goals we must work for the establishment of a common "language" allowing a fully digital interaction of all European citizens with public administrations at a continental level without any knowledge of their specific competences and roles: efficient public services are based on "traveling" data and do not need travelling citizens.

ACKNOWLEDGMENTS

This document has been written with Open Office versio2.4.1 for Mac OS X.

NOTES
[62] http://robertogaloppini.net
[63] http://www.fsugitalia.org

REFERENCES

[1] Denardis L., Tam E., Open documents and democracy, a political basis for open document standards. Yale information society project, http://isp.law.yale.edu (2001)

[2] Draft Final Report of the Project Team of the CEN/ISSS eGovernment Focus Group on the eGovernment Standards Roadmap (2008) www.egovpt.org/fg/Report

[3] Draft for public comments - As basis for EIF 2.0 (15/07/2008) http://ec.europa.eu /idabc/images/mimetypes/pdf

[4] European Interoperability Framework. http://ec.europa.eu/idabc/en/chapter/5883

[5] Giving knowledge for free. The emergence of open educational resources. http://www.oecd.org/dataoecd/35/7/38654317.pdf

[6] US Committee for Economic Development (CED, Annual report 2006) http://www.ced.org/docs/report/re port_annual06.pdf

[7] Open standards, open source and open innovation: Harnessing the benefits of Openness. A report by the digitalconnections council fo the committee for economic development(april 2006)

[8] Standard Policy choices http://www.openxmlcommuni ty.org/policychoice.aspx

[9] ODF Alliance UK Action Group Technical Distinctions of ODF and OOXML - A Consultation Document www.iosn.net/open-standards/organizations/ODFA %20UKAG%20Technical%20White%20Paper.pdf

[10] Bob Sutor's Open blog http://www.sutor.com/newsite/blog-open/

[11] Craig Kitterman's Interoperability community blog

A Brief Compendium on Interoperability in Egovernment

Michele M. Missikoff
LEKS, IASI-CNR
Rome, Italy

ABSTRACT

This paper addresses some issues to be considered when starting a project aimed at the realization of an interoperability infrastructure in the context of public administration (PA) organizations. An interoperability framework is a complex artifact that requires the convergence of multiple competences, disciplines, methods and tools: from organizational theory to information systems, from semantic technologies to monitoring and assessment methods.

This paper does not intend to present an exhaustive treatment of the matter, but to introduce some of the key elements to be considered when starting an interoperability project in the PA. Therefore, this paper should be considered just as a starting point, to be followed by specific and more elaborated manuals and treaties.

KEYWORDS

Interoperability, enterprise modeling, networked government, ontology, interoperability maturity model, European Interoperability Framework.

INTRODUCTION

Interoperability is considered the methodological and technological basis of any future business ecosystem aimed at supporting tight cooperation among complex organizations.

The importance of interoperability is directly proportional to the diversity of the agents that intend to cooperate. European Union is considered the richest political area in terms of the variety of cultures, languages, laws, but also art, food, natural and economic resources.

Such a wealth means also that in Europe we face marked diversities at all possible administrative levels, from municipalities to provinces, to regions, till the national levels, including the emerging trans-national regions (e.g., Alpe Adria). Such differences may represent today an obstacle for a sustained economical and social growth. But at the same time, they represent a unique opportunity, if we accept the challenge to turn such wide diversities into assets, values to be leveraged on.

The above considerations are today widely recognised and shared. This is particularly true at the level of European regional administrations, since the regional dimension is where the local culture and the specific features of the territory are mostly felt. And, furthermore, the regional level is the locus where a synthesis must be sought, between the two apparently opposite pushes: the need to preserve the local identity and the movement towards the regional European integration.

Besides the great challenges described above, it is important to remind that interoperability plays a central role in the process of modernization of the public administration (PA). When addressing the technological innovation that can be introduced in the PA offices, often the study starts from the analysis of what are the critical points, what are the crucial processes, and how the technology can improve the delivered services. Today, technology plays a central role in the transformation of the organizational models, the offered services, the relationships between citizens and public offices. However, current approaches appear often "shortsighted" since today the goal is not to improve the PA services and operations but to deeply "rethink" them.

More than thirty years ago, at the dawn of the introduction of computers in complex organizations such revolutionary thinking was already pushed forward by a well renowned scientist of the organization: Stafford Beer. Beer, answering to someone asking how to identify the most critical functions of an enterprise, where to push forward the use of computers, replied: "*A better formulation is to ask how the enterprise should be run given that computer exist. The best version of all is the question asking what, given computer, the enterprise now is.*" [19].

The sentence can be easily reformulated, asking what should be today the public administration and the government, given the ICT solutions currently available. In essence, we need to deeply rethink to the eGovernment, from a fully innovative angle. The goal today is to identify new organizational models, new operational paradigms, new roles and values for the civil servants, but also to rethink the positioning of citizens and businesses in the value chains of delivered services. We need to seek for new ways of delivering existing services in a more flexible, effective and efficient way, and to think about fully new services not even conceivable in traditional settings.

THE NETWORKED GOVERNMENT

The main ideas of Stafford Beer were about:

• Achieving highly connected organization structures, where.

• Possibility for each actor to receiving/accessing the right information, when needed, where needed.

• Decisions made by using a sort of "collective intelligence", i.e., by involving all knowledgeable participating actors (but keeping clear roles and responsibilities).

• Achieving organization models flexible and adaptable to a continuously changing reality.

225

Such an idealistic scenario is primarily based on the smooth, consistent and trusted flow of information among the different players. Today we better understand the organizational architecture Stafford Beer had in mind, but we still are struggling to see, on the practical ground, how all this can be achieved. To have visionary objectives is very important, but at the same time, there is the need to realistically drawing roadmaps and feasibility paths, that make a transition from the current reality to future scenarios actually feasible.

Flexible networked organizations

Within this context of increasing collaboration, public administrations are transforming themselves into "networked organisations", in order to enhance their flexibility and reduce operational costs.

In such a scenario, the key requirement is represented by rich and effective interactions with a wider community of actors: citizens, businesses, social communities, where the PA adopts at the front-end side more dynamic and flexible work practices. At the back-end side, new organization models, such as "virtual organisations", are continuously explored, with the aim of synergically connect with all the players who may support the production of public services, according to a PPP (Public-Private Partnership) paradigm.

All players, from PA offices to specific service providers (involved in a great variety of services: from street cleaning to healthcare, from education to environment control), need to be systematically interoperable in order to achieve seamless business interaction across organisational boundaries. An advanced interoperability infrastructure is the precondition for achieving a networked organisation.

The relationships among networked organisations may vary widely, with time and place. This implies that the underlying IT systems, that support the execution of the business processes among and within networked organisations, have to be flexible and adaptable.

Here we summarize a few organizational objectives that need to be reached in the networked Government:

• To realise more economic operations through improvements in efficiency, productivity and cost effectiveness.

• To realise more flexible, fluid and nimble business processes which are able to respond to new citizens and businesses needs.

• To realise more knowledge-intensive business processes, which are based on the wide diffusion and re-use of knowledge assets.

• To realise more robust business processes through stable and dependable solutions, which must be also scalable and recoverable.

• To realise more valuable business processes, operating in long term and more general perspectives.

The above objectives need to be supported by advanced ICT solutions. In particular, it is necessary:

- To define a technologically neutral reference model that provides a stable, generic foundation for the specific interoperability platform.

- To define interoperability requirements for applications, data and communications and provide solutions that meet these requirements.

- To provide methods which organizations can use to manage organisational roles, skills, competencies, and knowledge assets, for its own operation and for collaboration with other organizations.

- To provide semantic mediation solutions which enable and support the above.

- To provide components of interoperability infrastructures.

Focusing on the interoperability facets

An Interoperability Platform is a technological solution that supports two or more software applications in exchanging data and achieving a common objective, even if the two applications have not been originally conceived to cooperate.

Interoperability can take place at different levels. From the exchange of simple data items to structured documents (e.g., a purchase order), to business process cooperation, necessary when different organizations need to tightly interact in achieving a common objective. The latter requires that also the organizations that use the software applications are able to connect to each other and interoperate. When an organization decides to undertake a project for an interoperability infrastructure, it is important that it starts by drawing a comprehensive picture, taking into consideration three main investigation dimensions[64]: (i) *interoperability levels*, (ii) *interoperability scope*, and (iii) *interoperability maturity model*. These three dimensions are illustrated in the following sections.

THE INTEROPERABILITY LEVELS

Interoperability takes place at different levels. Each level identifies an area where incompatibility between two cooperating parties may arise and where the corresponding solutions should be placed. A seminal proposal of such a layered organization was presented by the IDABC - EIF 1.0 report, issued in 2004 [1] that introduced the three levels: *technological, semantic*, and *organizational*. Today, IDABC is about to release the EIF 2.0 report that, with respect to the previous version, has two more levels: *legal interoperability and political context*.

NOTES

[64] Please note that only the first dimension, out of the three indicated, refers to one facet of the cube proposed by the IDBAC – EIF 2.0 draft report, as illustrated in the next section.

This is a very important enhancement that takes into consideration the extended scope of the interoperability challenge. In order to have a full coverage of existing problems, one could even add a sixth level, on top of all: the cultural level. In this section we briefly recap the content of the mentioned interoperability levels, starting form the most general, that we proposed on top of the five levels of the EIF 2.0 draft [2].

Cultural level

This level is introduced with the idea that, to achieve effective interoperability among diverse organizations, it is suitable that a number of social values and objectives are largely shared. To this end, it is necessary to fostering the common perception of such values, aiming at achieving a more cohesive society. A culture of interoperability implies a diffused awareness, at all levels of the society, of the importance of a shared spirit of cooperation, with mutual respect and social solidarity. The awareness of this cultural level is particularly important in the early stages, when citizens, businesses, and civil servant are confronted with new cooperation paradigms that require facing the changes and costs of the interoperability revolution.

Political context

The existing societal culture is largely determined by the *political context* that in the hierarchy of EIF 2.0 represents the top level. Such a level has two main facets (and connected responsibilities, since here is the actual centre where the main decisions are made). The first is connected to the level above: in the spreading of the culture of cooperation and interoperability the political context has large responsibilities, since it should lead such a movement. The second is much more pragmatic, since past experiences demonstrated that, in absence of a strong political commitment, big transformations in the PA and the Government are not achievable.

Organizational interoperability

For an effective and far-reaching cooperation between two organizations, it is required that *organizational interoperability* is also addressed. The latter concerns the capability of two cooperating organizations to effectively perform a cooperative task, efficiently (i.e., through computer-based procedures) exchanging information and services. Furthermore, this level also regards the progressive adoption of best practices, and standards necessary to support and ease an effective interoperability. Organizational interoperability is generally supported by adopting an appropriate organizational framework[65], such as ebXML, TOGAF, or e-GIF (the latter strongly promoted by UK Gov).

NOTES
[65] www.ebxml.org; TOGAF: www.togaf.org and http://www.ibm.com/developerworks/library/ar-togaf1/, Dept of Work and Pension http://www.dwp.gov.uk/; e-GIF: www.govtalk.gov.uk

Legal interoperability

The other newly introduced level, not originally present in the IDABC – EIF 1.0, concerns *legal interoperability*. This level primarily addresses the formal acts and the operational procedure that are regulated by law. We know that the operations and information management of PAs, as opposed to the business world, is highly regulated. Therefore, when new solutions appear, which would increase the efficiency and effectiveness of a public office, it is necessary first of all to see if such solutions are compatible with the existing laws and regulations, i.e., if they are legally feasible. With this respect, when two PAs intend to start new forms of cooperation, there is a huge amount of preliminary work at legal level, to see if and to what extent the legislation will help or hinder such cooperation. This problem is increasing along a line that goes from intra-organization to inter-organization, to cross-border cooperations.

Semantic interoperability

Semantic interoperability is able to tackle divergences in the structure, organization and (for a certain extent) content of the exchanged data, by means of semantic reconciliation solutions. Semantic interoperability should guarantee that the semantic content of the message is preserved, the intended meaning is correctly conveyed, the information is correctly acquired by the recipient, and the expected (by the requestor, i.e., the message sender) actions are understood and undertaken [3]. This is a very advanced functional area that, due to space limitation, will not be addressed in the paper.

Technological interoperability

Technological interoperability includes both hardware and software issues. The former mainly concern connectivity and protocols (e.g., TCP/IP), while the latter impact with message passing and data structuring. This level is substantially solved, thanks to the extensive adoption of common standards for data syntax (e.g., XML [4]), but also for message passing (e.g., SOAP and WSDL [10]). A Technological Interoperability platform allows two software applications to reliably exchange messages, but any form of manipulation or meaningful interpretation (e.g., aiming at data integration or reconciliation) of message content remains outside of its scope.

INTEROPERABILITY SCOPE

The 5+1 interoperability levels illustrated in the previous section are largely interdependent. For instance, the achievement of the One-stop government model, i.e., the possibility for a citizen to have a single point of contact when interacting with the PA, requires that several public offices are able to coordinate and share common goals. To this end, all the interoperability levels come into play.

But such encompassing situation can (must) be achieved with a well calibrated progression, in terms of the interoperability scope. This is the second dimension of the interoperability domain. The interoperability scope is determined by the kinds of object that are considered and managed by the desired interoperability infrastructure, namely.

Simple data items

When an office can automatically access individual data items that formally belong to (are managed by) another office. Here we have a number of issues to be solved, that go from the identification of the requestor and his/her access rights to the format of the exchanged data. And we have already a semantic problem related to the correct identification of what are the data to be returned. In case that there is not a pre-defined agreement between requestor and provider, an impromptu request must be consistently formulated by the requestor and, symmetrically, interpreted by the provider.

Structured documents

In this case the exchange is much more important, especially if we consider also certified documents. In addition to the previous interoperability solutions, here we have further technologies, such as *reconciliation rules* (that plays a central role), *digital signature, and non repudiation*. The first stage of the key PEGS (Pan-European eGovernment Services, e.g., eProcurement) starts from here.

e-Services[66]

E-Service interoperability is the next step. Even if in the PA the interaction among offices, and between the latter and the citizen, takes place by exchanging documents, in this case we mainly consider operational issues (but at this level the behavioral aspects are not fully transparent). Here, the cooperation starts with the request of an e-service that can be punctual or complex. In the latter case, when the requestor invokes an e-service, he/she should provide some complex information associated. Symmetrically, the service may have a complex outcome, demanding a certain amount of work by the requestor to check if the service has actually delivered what expected (according to an agreed SLA).

NOTES

[66] The term "service" is overly used with plenty of different meanings. Here we use "e-service" to distinguish it from a service delivered by a public administration to a citizen or business. Furthermore, an e-service is mainly enacted by an ICT system

Processes

When interoperability reaches this tier, there is a tight cooperation that takes place among several PA units. In general, each PA unit has its own *modus operandi*, data organization and, often, software applications. Each cooperating party will expose the public views of its processes.

The differences in the modus operandi will be tackled with synchronization points, in some cases, and with reconciliation and mediation facilities in other cases (e.g., when diverging decision criteria or different interpretation of the law are present). Another issue is represented by the level of visibility on the internal procedures an administration decides to grant to the cooperating partners.

Organization models

The PA unit is the "engine" that enacts the (internal) actions necessary to provide the services, carrying to completion a (possibly shared) business process. The organizational model determines how such an engine practically operates (the mentioned *modus operandi*). It often happens that operational conflicts arise between two PA units, which are not easily mediated, since they derive from divergence on their organizational models. This can even happen in highly regulated areas, since two units may interpret in a different way the same directives. This tier is highly influenced by the Legal level reported in the previous section since, as suggested above, beyond the legal directives there is the human interpretation.

Objectives and Strategies

This is the topmost tier, where the political level (the topmost level of EIF 2.0) plays a central role. In principle, here we need to consider the main interests of the citizens, and of the society as a whole.

Then, the objective and strategies of the public administration should be defined accordingly. However, it is well known that in any social group, community, or public office, besides the "official" objectives and strategies there is the so called "hidden agenda", often not consistent with the official one.

The goal of explicitly merging the objectives of two or more PA units is not an easy one. For instance, the need of cost reduction of a unit that provides a service may conflict with the need of speed and quality of another unit, requesting that service. These kinds of problem must be, if not solved, at least mediated with cross-organizational initiatives.

However, when the hidden agendas come into play, the problem is more serious. But also in this case, if there is the political endorsement, strong initiatives on transparency, accountability, concern raising, the problem can be reduced.
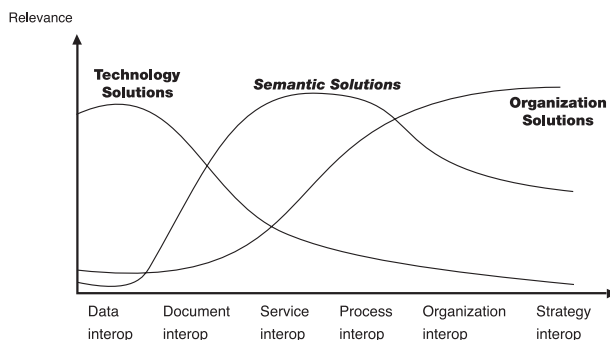
Figure 1 - Interoperability levels and scope

Often, a further dimension is considered, especially in the context of a global view of e-Government, related to the territorial context, e.g., city, province, region, or nation scale (including both horizontal and vertical interoperability.) It is important to carefully consider the relevance of interoperability levels with respect to the 6 scope tiers identified in the previous section, as reported in Figure 1.

IMM: INTEROPERABILITY MATURITY MODEL

The third dimension of interoperability, somehow orthogonal to the two previous ones, concerns the maturity stage that an organization is capable to deploy in achieving interoperability. The adoption of an Interoperability Platform is not a value per se, its value depends on the context of the cooperation among organizational units and the achieved benefits. When complex organizations start a process aimed at integrating its different databases and application systems they should clearly define the progressive stages of interoperability that they want to achieve. To help in this direction, a layered maturity model for interoperability has been proposed: IMM (Interoperability Maturity Model[67]). The IMM (already adopted by advanced administrations, such as the Australian Government[68]) closely follows the CMM (Capability Maturity Model Initiative) reference framework [5] and consists of the following 5 maturity levels:

• Initial;

• Managed;

• Defined;

• Measured;

• Optimised.

NOTES
[67] Sometimes prefixed with Enterprise: EIMM. http://modelbased.net/aif/methodology/eimm.pdf
[68] www.nehta.gov.au

Such levels represent also a good progression that an administration may go through when starting an interoperability project.

Reaching each of the four latter levels requires the attainment of the previous levels. Below, a better specification of the IMM levels is reported.

Initial

At this stage there is an early awareness of e-Gov interoperability requirements and functions, and perhaps some early e-Gov interoperability solutions are adopted, typically localised within certain offices or administrative domains.

There is neither a systematic approach nor a defined initiative to realise an interoperability infrastructure. The solutions are achieved *ad hoc*, when needed, and the addressed problems are of limited complexity, typically consisting of data exchange.

Managed

At this stage, the interoperability has entered in the agenda of the organisation. Some concrete initiatives have been planned and, to a certain extent, some solutions deployed.

The organization will begin accomplishing some interoperability goals, such as the adoption of specific business standards while gaining an early, shared understanding of data, services or internal process models. Furthermore, initial governance has been established to ensure repetition of earlier successes.

Defined

At this stage, a full understanding of interoperability needs have been reached. A defined program, with goals, milestones, resources, and activities, has been drawn.

Furthermore, the organisation has established a set of guidelines for the adoption of e-Government standards and best practices for data, services and processes, according to the lessons learned from previous maturity stages.

The guidelines are further enriched with explicit accounts on policies and legal compliance. Governance is clearly specified and defined levels of organisational readiness for interoperability outcomes are established.

Communication protocols for interaction with internal actors and external partners are established, as well as the supporting organisational structures, facilitating a shared understanding across technical and semantic issues.

233

Measured

At this stage, the organisation has established processes for the governance of the interoperability infrastructure, including measuring and appraisal activities. This has two facets: one concerns the functional conformance to the requirements, the other the non-functional aspects, such as the usage degree of the efficiency.

A governance plan can be defined before the interoperability infrastructure is deployed, for what concerns conformance and compliance aspects (e.g., adopting the CAF [18]). But, in general, a complex interoperability infrastructure is deployed in a progressive manner, according to a phased approach; therefore, the conformance and compliance assessment should be done at the completion of each phase.

Then, at run-time, monitoring and measuring must take place during the operations of the system, to assess the performances, the actual degree of usage (in the first period it is difficult to loose, for instance, the temptation to come back to the previous, human shortcuts), and the attainment of the expected benefits.

Optimised

This is the last stage in terms of interoperability maturity of a complex organization. To achieve this level, a full interoperability infrastructure has been implemented and adopted. There is a systematic view (obtained with thoughrough modelling approaches) of the functional units operating in the different sectors, the business processes, the exchanged documents and shared information needed for a smooth collaboration.

Furthermore, there is a functional unit dedicated to the continuous monitoring and improving of the interoperability operations, supporting the governance. Such interoperability governance unit has implemented processes to support continuous interoperability improvement, driven by feedbacks from monitored processes, with the aim of ameliorate specific processes and the overall e-Gov interoperability capability, both within and cross-sector, for the interactions with the other administrations.

THE STANDARDS

An interoperability infrastructure is a complex socio-technical system. Due to its high complexity, the variety of converging disciplines, plus the relatively young history, in terms of standards there are not yet comprehensive proposals. However, it is possible to find effective standards for what concerns the individual disciplines that concur to form an interoperability infrastructure.

With this respect, it is opportune to report a few important standards and accepted techniques, placing them along the three traditional EIF interoperability levels: organization, technology, and semantics.

Standards for the organization level

The central discipline here is that of modelling, therefore the consolidated modelling standards (such as UML) are the key reference. It is opportune to recall that in order to deploy and maintain effective interoperability solutions, including the capability of achieving a target IMM level, it is mandatory to adopt systematic modelling techniques. Here there is a rich set of proposals, emerging also from the enterprise sector [6]. Modelling an enterprise, or a PA organization, is a complex objective. In the last years, the discipline of enterprise modelling has substantially progressed, also thanks to new approaches and paradigms centered on processes and services. Such modelling techniques are based on the idea of facilitating the deployment of service-oriented organizational models, with a strong process view of the organization. This kind of approach is also suited to the deployment of methods and tools aimed at the verification of the actual interoperability levels. As anticipated, among the most popular enterprise modelling framework we can cite: Zachman, ebXML, TOGAF [7]. The latter has been extensively experimented in several e-Gov contexts, in particular in UK, Dept. of Work and Pension (DWP) and Police Department (PITO). Other important standards concern the form of business documents, such as the Universal Business Language (UBL [8]).

Standards for the technology level

Today we can give for granted the lower technological level, aimed at connectivity and message transport (e.g., TCP/IP). At software application level, an important factor for the success of an interoperability project is the capacity of achieving digital information exchange among different administration. In this area also, at the technological level, the problems are substantially solved, thanks to the introduction of XML firstly, and later the advent of more flexible (and semantics-oriented) standard, such as RDF(S) [9] and OWL[69]. Other standards have a central importance for e-services exchange, such as SOAP and WSDL [10].

Standards for the semantic level

Semantics is about the actual content, i.e., modeling the exchanged data, exposed e-services, and deployed processes. These reflect the real world, with its wealth of diversity in the ways people live, work, producing values, spend their free time in public and private contexts. And the government presence cuts across all such contexts. From education to health, from transportation to taxes, it is really difficult to build coherent and interconnected standards. But if we restrict the scope to the specific discipline of administration (of resources, projects, services, etc.), we can see that it bears large commonalities with the business sector, where several proposals have been formulated in the past [17]. Among the most relevant, we may cite the Toronto Virtual Enterprise (TOVE) Project [11] and the Enterprise Ontology Project [12].

NOTES
[69] We consider such languages better classified under "technology" rather than "semantics"

According to the literature [13]:

"*The TOVE project defines a generic, reusable data model that provides a shared terminology for the enterprise that each player can jointly understand and use. The Enterprise Ontology project's goal is to provide a collection of terms and definitions relevant to business enterprises to enable coping with a fast changing environment through improved business planning, greater flexibility, more effective communication and integration.*"

Unfortunately, these vast initiatives did not actually took off. Probably, the ambition of defining a sort of Encyclopaedia of the enterprise and its business processes is not feasible, due to the inherent complexity, the large variety of instances, and their high dynamicity.

Today, we see a more realistic approach that does not strive to achieve a full semantic modelling of a complex organization, but rather provides basic elements and a constructive method. Then, each administration can proceed to build its own semantic repository, keeping a common basis. In essence, the approach is based on three main elements, namely:

(i) elementary items (e.g., date, price, address) with a clear semantics, rather than complex administrative artefacts (e.g., invoice, certificate, etc.); (ii) a bottom-up constructive semantics that, for instance, sees an invoice as the composition of elementary items; (iii) segmentation of specific administrative sectors, such as *eProcurement* that is considered by the European Commission as the key e-Government. Along this line there are two important initiatives. The first is the Common Procurement Vocabulary (CPV, containing more than 400.000 entries, defined in all the languages of the EU [14]). The CPV establishes a single classification system for public procurement aimed at standardising the references used by contracting authorities and entities. The other is the Universal Data Element Framework (UDEF [15]). It is mainly a naming convention and a catalogue of basic terms. It currently covers the kinds of information most commonly used in administrative processes, and proposes a simple mechanism for extending it to cover more specialized information, used by particular administrations or within vertical market groups. The use of UDEF is not intended to substitute the specific terminology (and the corresponding labelling of information elements) adopted in an organization. It is used to annotate such elements, in order to provide a common, agreed reference to the latter. These proposals, as anticipated, represent an inversion of the main trends of the 90s. It is likely that this more "soft" approach will lead to better results than the previous holistic approaches.

A ROADMAP TO INTEROPERABILITY

In general, it is not always necessary to achieve the ultimate interoperability scope. When a PA unit starts an interoperability undertaking, it is important that it proceeds in a systematic way, along a trajectory that guarantees a certainty for time, cost, and the expected benefits of the project. Below, we sketchily report the key legs of a virtuous interoperability project.

Interoperability architecture design

Before starting an important interoperability project in the context of PAs, it is chiefly important to draw a global picture. This includes a feasibility study, where targets, scope, business processes, information needs, involved players are initially identified. Then, a systematic modelling activity should take place, to clarify and document the initial "as is" scenario. To this end, the adoption of a Model-Driven Approach (MDA) is highly recommended [16]. Extensive modelling, at different levels and about different objects, is the right way to go.

From "As-is" to "To-be" scenario

Having modelled the current situation, it is important to proceed to the modeling of the "to be" scenario, identifying the main objectives of the intervention. To this end, it is advisable to use an experimented method For instance, the Commission is promoting a Common Assessment Framework (CAF), derived from the EFQM (European Framework for Quality Managemet), that represents a valid option to be adopted when starting an interoperability project.

Interoperability target

Then, it is necessary to identify what are the collaborating parties and the cooperation level sought with each of them. In fact, the interoperability scope can be diversified, depending on the partner and the activities that are covered. The effort to be undertaken will also depend on the interoperability maturity of the cooperating parties and their propension to tackle the required changes.

Defining an Interoperability project

Having identified the starting point, i.e., the "as-is" situation, and the "to-be" objectives of the PA unit, and having also identified the suitable IMM for the organization, it is possible to design a project, where intermediate goals and steps, necessary resources, and the needed reorganization are specified.

Monitoring and Measuring

Real world is constantly moving, evolving, changing. Therefore, once concluded the rollout of an interoperability infrastructure, and accordingly changed the organization, the job is not concluded.

It is necessary to constantly monitoring, with different techniques and at different levels, how the global system, the cooperation network is behaving.

The key issue now is to verify if the derived benefits are as expected [18]. To this end, various methods and tools are available on the market. But the central element is represented by the Key Performance Indicators (KPI).

Measures and alerts are important to trigger new correcting actions. Periodically, an extensive check-up is required, when the alerts are too frequent and ad hoc interventions are no more economically beneficial. In conclusion, when an important interoperability project is started in the PA, it is crucial to identify precise objectives, and to realize extensive modelling of the operating scenario.

Then, organizational changes, resources, and a roadmap, should be determined, according to the defined objectives.

CONCLUSION

In this brief note we intended to address (although in a sketchy way) the main issues that should be considered when starting an interoperability project in the context of the PA.

We showed that interoperability solutions can vary in scope and complexity, but it is possible to address the development of an infrastructure with a progressive approach.

To this end, it is important to start defining a roadmap, where interoperability objectives, scope, resources and time are clearly indicated. Such an e-Government Interoperability Roadmap (e-GIR) will be an important reference document in the successive take-up phases that may span over time and space.

In particular, the e-GIR should provide a sound foundation for the implementation plan of an interoperability project built upon an actionable vision and a feasibility study. The latter should provide:

- Common (to all involved players) framework for determining government-wide priorities for interoperability initiatives.

- Problems and needs assessment for the key targets: scope, players, interoperability levels, etc.

- Agreement on interoperability maturity levels (IMM), both at the starting and target points.

- Strategic design alternatives.

- Intended business features/innovations.

- Available time and resources.

- Guaranteed endorsement of top administrators and politicians.

- Change management plans.

- Human resources empowerment plans.

- Suggested plan and key milestones.

- Framework for monitoring, measuring, and assessment.

A comprehensive e-GIR will also guarantees that the initial achievements (and investment), even if the decision was to start with a limited scope, will be coherent with the successive developments, ensuring that the initial expenditures will be preserved.

In this way, the benefits will be tangible since the early phases, the introduced solutions will be progressively consolidated, and the committed resources will be optimally employed.

REFERENCES

[14] IDABC - European Interoperability Framework for pan-European eGovernment Services. EIF 1.0, available at < http://ec.europa.eu/idabc/en/document/3473/5585 >

[15] IDABC - European Interoperability Framework for pan-European eGovernment Services. EIF 2.0. Draft. http://ec.europa.eu/idabc/en/document/3473/5585

[16] Frankel, D., "Business Network Transformation and Semantic Interoperability". www.sap.com.

[17] Extensible Markup Language (XML) 1.0, W3C Recommendation 10-02-1998, http://www.w3.org/TR/1998/REC-xml-19980210.

[18] ESI – Capability Maturity Model. http://www.sei.cmu.edu/cmm/

[19] Bernus, P., "Enterprise models for enterprise architecture and ISO 9000:2000". Annual Reviews in Control 27 (2003). See also: www.zifa.com

[20] Vernadat, F.B., "Enterprise modeling and integration (EMI): Current status and research perspectives". Annual Reviews in Control 26 (2002)

[21] UBL – Universal Business Language. http://www.oasis-open.org/committees/ubl/

[22] Resource Description Framework (RDF) Model and Syntax, W3C Recommendation 22 February 1999, http://www.w3.org/TR/REC-rdf-syntax/.

[23] SOA – Service-Oriented Architecture, www.oasis-open.org.

[24] Fox, M., et al, "An Organization Ontology for Enterprise Modeling: Preliminary Concepts"; Computers in Industry, 1996, Vol. 19

[25] Uschold, M., et. al., "The Enterprise Ontology," The Knowledge Engineering Review, Vol. 13(1), pp. 31-89, Special Issue on "Putting Ontologies to Use," (eds. Uschold, M. and Tate, A.), Cambridge University Press.

[26] Fox, M.S. and Grunninger, M., "Ontologies for enterprise integration". Proc. of Second International COnfernce on Cooperative Information Systems (CoopIS), 1994.

[27] CPV - http://simap.europa.eu/codes-and-nomenclatures/codes-cpv_en.html

[28] UDEF – Universal Data Element Framework. http://www.opengroup.org/udef/

[29] Meta-Object Facility, Object Management Group. http://www.omg.org/mof.

[30] Missikoff M., Taglino F., "The Architecture of an Ontology-based Platform for Semantic interoperability"; in Handbook on Ontologies (S.Staab and R.Studer, Eds), pp. 617-634, Springer Verlag, 2004.

[31] Common Assessment Framework – CAF http://www.eipa.eu/CAF/Articles/egov_final_report.pdf

[32] Beer, S., "Brain of the Firm"; Second Edition, John Wiley, 1981

Spc – The Italian Interoperabilty Framework with Services

Francesco Tortorelli
CNIPA - Italian e-Government agency
Rome, Italy
Tortorelli@cnipa.it

Roberto Baldoni
Univ. di Roma - La Sapienza
Dip.to di informatica e Sistemica
Rome, Italy
Baldoni@dis.uniroma1.it

ABSTRACT

The development of e-government services is a multidimensional, strategic and continuous planning of complex processes which involve legal, organizational and technological aspects.

At the same time, the e-government services involve central and local public bodies and interactions with associations and banks.

The Italian experience, with a strong involvement of PAs, ICT market, universities and research centers, has defined an unique legal framework (for central and local administrations), named the Digital Administration Code (CAD in Italian), that sets mandatory constraints, organizational aspects, technical infrastructures, compliance regulation and governance, for creating e-Government services.

SPC, defined in CAD, is the Italian interoperability framework, that also provides services for interoperability from network to application level and, at the same time, it is the environment that supports the creation of shared services for Italian PAs.

In other words, SPC is the Public Administration (central and local) enterprise architecture that relates and aligns ICT with the governmental functions that it supports.

KEYWORDS

Interoperability framework, enterprise architecture, service agreements, identity management.

241

INTRODUCTION

Even though the process of decentralization of competencies (federalism), started with the reform of the Italian Costitution in 2001, and the diversification of ICT solutions, it can help in defining and actuating in a rapid way political objectives (defined by laws) at the regional or local level, it will make tremendously difficult the implementation of political objectives at the inter-regional or national level sharing local and central competencies. Many examples of such strategic objectives can be found in the areas of healthcare, employment, register offices, tax offices, etc. If not mastered properly, this process of decentralization can lead to a lack of interoperability among the PAs instead of turning out in an advantage for the country.

In this context, the issue is to set-up an organizational process, together with technical solutions, that would allow the development of nationwide application cooperation/integration between back offices. On the other hand, for e-valued e-Government services is necessary to master properly the identity and the roles used by the user (lawyer, tax consultant, employer inspector, civil register officer, etc.), defining rules for a nationwide (federated) system of identity management, for both back-office and web interactions. Even if *web services* are the technological instrument enabling the solution, it requires a strategic vision, based on a bottom-up process for reaching a shared PA-wide Enterprise Architecture.

The aim of this paper is to outline:

• Strategic actions that, at the level of overall governance of the Italian e-Government processes, have been undertaken.

• The enterprise architecture and the innovative technological solutions that have been adopted for the realization of such a nationwide system, referred as SPCoop - Sistema Pubblico di Cooperazione [Public Cooperative System].

Between 2003-2005, different working groups, with a large participations of administrations, Universities, research centers, defined the legal and technical framework of a nationwide interoperability framework. These working groups defined, as well, the related enterprise architecture, the services, the organizational aspects and the enterprise architecture's governance. At the moment, the strategic actions at the political level uses this framework for creating agreements in the Public-Private-Partnerships, in order to guarantee a diffusion of e-government services, reducing the bureaucracy costs and the digital divide.

STRATEGIC AND GOVERNANCE ACTIONS

In 2003, CNIPA[70] started the coordination of a nationwide bottom-up consensus operation, with the participation of over 300 expert people, from basic telecommunication services to advanced application cooperation.

NOTES
[70] CNIPA is a government agency who implement e-government policy delivered by the Minister of Public Administration and Innovation

The outcome has been a set of about 30 documents describing a technical and organizational nationwide system for network, communication, basic interoperability, cooperation and security services among administrations. This system consists of SPC - Sistema Pubblico di Connettività e Cooperazione [Public Connection and Cooperation System]. Inside SPC, the part over the network services dedicated to the application cooperation among PAs and the interactions with citizen and enterprise is named SPCoop.

The Legal Interoperability Framework

In parallel to the bottom-up process for the definition of SPC and SPCoop, the Government issued in February 2005 a Law Decree, named the digital administration code (CAD) (Law decree n. 82/05), that defined the legal interoperability framework. CAD, in more fields, revised previous laws and defined a comprehensive set of rules regarding the digitalization of the PAs, grouped in the following sectors:

• The rights of citizens and enterprises on Public Administration.

• Citizens and enterprises must be placed at centre of PAs services.

• Digital signatures and legal validity.

• Contracts, payments and accounting deeds.

• Development, acquisition and reuse of software in Pas.

• The Public Connection and Cooperation System.

Moreover, as far as SPCoop and SPC is concerned, CAD establishes its scope, the sectors of interest, the governance, the technical rules of the Italian Enterprise Architecture, and the subsidiarity principles among National authorities and local ones. Additionally, CAD establishes two important principles:

• The cooperation among administrations is exclusively carried out on SPCoop, with its tools and according to its technical rules; it has legal value and no further decree or official publication (e.g., on the Gazette) is needed (e.g., when defining standard XML formats for data exchange).

• The public ICT managers need to organize their information systems, including organizational and management aspects, in order to accommodate SPCoop rules.

The Italian Enterprise Architecture

SPC is not only a software framework, but also a technical and organizational platform whose aim is to create the conditions for a long-lived legally valid cooperation among administrations.
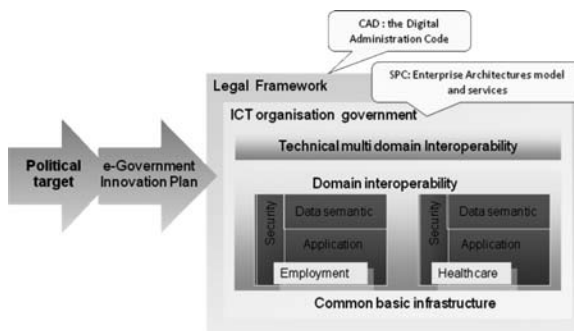
Fig. 1 – ICT organization and governance

SPC is based on six pillars which are leading-edge in terms of technologies, best practices and organization: (i) formalization, and successive publication, of service agreements between PAs; (ii) definition of a federated identity management system for access control; (iii) definition of the metadata about the effective data to be used for cooperating, of the semantics and of domains' ontologies; (iv) unique federate network who connects all public administration's sites; (v) federate management of security, quality and privacy; (vi) open and continuous update of the SPC model, by taking into account the latest progress in technologies and standards.

The CAD states the creation and governance of, the so named, shared infrastructures[71]. Those infrastructures allow technical interoperability at any level and may assure also the interoperability within the shared services as resulted from the subsidiary actions put in place at central and local level. During 2006, four public tenders have been launched concerning:

• Network services, including VoIP and ubiquitous connectivity. The contract has been awarded in June 2006 to 4 national providers (BT, FASTWEB, WIND and Telecom Italia). Such network services will form the basic communication. The part of national share infrastructure dedicate to network services assure a unique federate network including other networks realized at regional level with the same managed security e quality to all the Pas.

• Infrastructure connecting national and local authorities.

• Shared network infrastructures, including services for managing the Service Level Agreements (SLAs) of the SPC providers, the security and the VoIP services.

• An initial set services, compliant with the model, including identity management, PA Web site/portals creation and management, Domain Gateways and tools for wrapping back-office applications as SPC Web services to be deployed on the Domain Gateways.

• The effective SPCoop framework, as detailed in the following of the paper.

NOTES
[71] For the CAD S.I. are all of the SPC resources (hardware and software components, rules, documents, services) managed by the CNIPA, also employing third parties, including the operating structures for the control and supervision of these resources, in order to allow secure connections, developed interoperability and application cooperation between Administrations throughout the country

Accompanying Measures

Another strategic actions has regarded the strong involvement of local administrations in the rule's definition, in the governance and in the realization of pilot. During the last three years, 56 regional projects on e-Government, focused on network and interoperability infrastructures, have been cofounded by central government. These projects will provide best practices as well as reference implementations of the different SPC elements, in order to direct the bottom-up approach. The biggest project is ICAR (Interoperability and Application Cooperation among Regions), started in June 2006 with 17 partners including 16 out of 19 Italian Regions. The results from these projects were: the compliance of large horizontal projects with SPCoop; the complete definition and advertisement of about 50 service agreements, and the beginning of the definition of about another 100 service agreements; the definition of the core of an upper ontology and of two specific domain ontologies; finally, the definition of metric for service-level agreement, the design of a SLA monitoring system and the reference implementation of all the components.

Before concluding this section, we would like to point out how the governance and strategic actions presented above represent the success element of this challenge; adopting a common infrastructure for interoperability and cooperation on the basis of solely technical solutions has proved unsuccessful in the past, conversely the use of a community approach to realize evolving versions of the framework and to create a SPC "culture" in the PAs seems a better solution.

Such a community is expected to be led by administrations, with the active participation of industries and universities. This also constitutes an enabling factor for the overall innovation process of the whole country. Other relevant success keys are the shared governance of the model and the shared infrastructure.

The SPC board assure the governance, having an high commitment by law and an high representative being appointed by Ministers or by the Assembly of local administration[72].

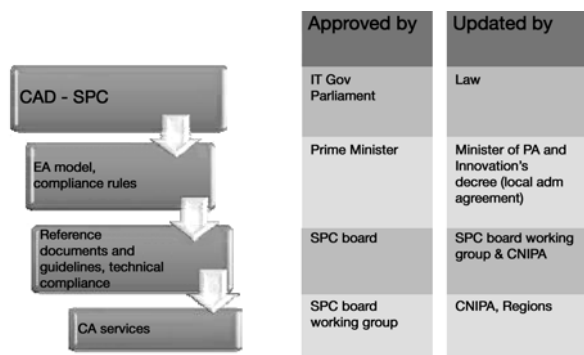|	Approved by	Updated by
CAD - SPC	IT Gov Parliament	Law
EA model, compliance rules	Prime Minister	Minister of PA and Innovation's decree (local adm agreement)
Reference documents and guidelines, technical compliance	SPC board	SPC board working group & CNIPA
CA services	SPC board working group	CNIPA, Regions

Fig. 2 – SPC's governance model

NOTES
[72] The political representative of local PAs

The documents published at first in 2005 and continuously updated, represents a technical road-map for such a community towards the effective SPC development, whereas typical community tools (e.g., online forums, development community, the continuous evaluation of standards by CNIPA, etc.) will support the process.

OVERVIEW OF SPCOOP ENTEPRISE ARCHITECTURE

The model proposed for SPCoop[73] is based on the following principles:

• The PAs cooperate through the supply and the use of application services; these services are offered by the single administration through a unique (logic) element belonging to its own information system called *Domain Gateway*.

In this way the complete autonomy of the single administration is guaranteed, as far as it concerns the implementation and management of the provided application services, as they can be based on any application platform, being it pre-existent or new, as long as they are supplied through the *Domain Gateway*.

The fruition of the application services is carried out through the exchange of messages, whose format is formally specified in the Italian standard referred to as *e-Gov envelope* Such a standard is basically an extension of SOAP.

• A service works on the basis of an agreement among at least two subjects (supplier and client); such agreements have a technical basis and an institutional/jurisdictional basis. These agreements should be formalized in order to support the development and the life-cycle of services in a (semi-)automatic way. The agreement specification is called Service Agreement and is based on the XML language.

• Sets of administrations, which need to cooperate in order to provide composite application services form a Cooperation Domain; the services supplied by such a domain are externally described through Service Agreements, and, internally, by a specification (BPEL) describing how the different PAs concur to compose the final service, referred to as Cooperation Agreement.

It emerges that the cooperation model of SPCoop is organized as a Service Oriented Architecture (SOA); but even if the basic aspects related to a SOA are well defined under a technological point of view, conversely it is necessary to extend the advanced aspects in order to make the architecture suitable to the specific e-Government scenario.

The reader should note that all the service architectures SOAs need a neutral element, technically called *service directory*, with the goal to mediate between the different subjects cooperating for the service supply/use; the SPCoop framework includes a set of infrastructural components to be used to simplify these operations (e.g., retrieving a service trough automatic categorization, managing digital identities, etc). They are represented in Figure 3:

NOTES
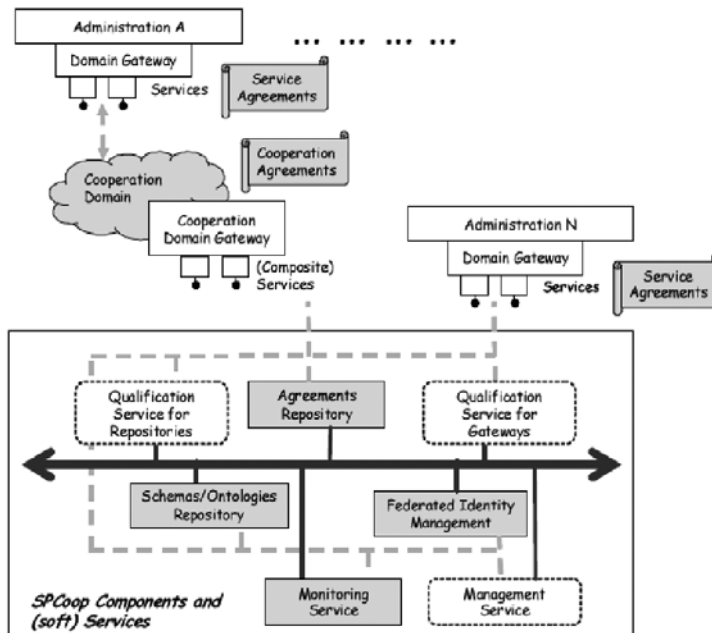[73] SPCoop is the part of SPC over the network services

Fig. 3 – The components and (soft) services of SPCoop

Agreements Repository is the software component used to register and to maintain the Cooperation/Service Agreements. It can be considered as the "database" of the cooperation. This component offers functionalities for the registration, the access, the update and the search of the agreements. The UDDI standard is the core of this component; however this standard does not offer all the required functionalities, therefore it has been extended.

Schemas/Ontologies Repository is the software component offering functionalities to deal with the service and information semantics, in order to find out services that are more suitable to provide required functionalities. This component acts as a structure to store ontologies and conceptual schemas, offering functionalities of registration, access, update and reasoning on them.

Federated Identity Management is used to authorize and control the access to application services over SPCoop. Generally access to a resource may be done on the base of a proof of an information's set related to a subject, e.g.: personal identity, professional qualification (i.e. lawyer, engineer), title/role (i.e. CEO, member of statutory auditors, manager, senior official, tax inspector). In Italy there isn't a single authority who provides identity (including roles, qualifications, etc.). The federation is needed to integrate different authorities and reuse identity. Integration is be done through specific interfaces supporting SAML v2.0.
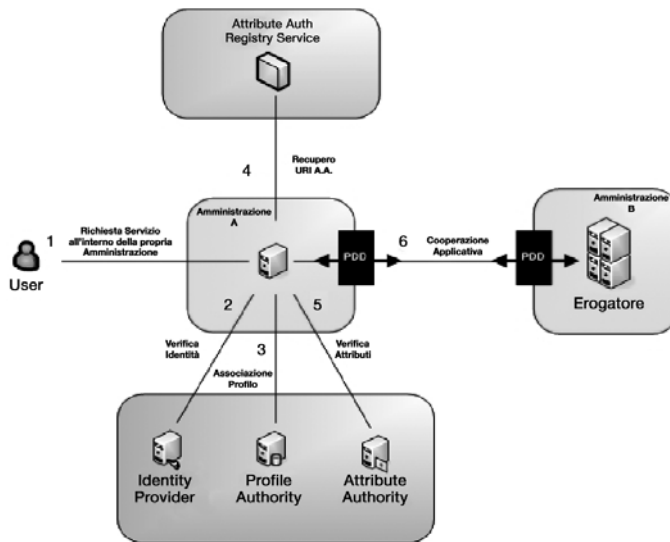
Fig. 4 – The components of the Identity management subsystem. The Attribute authority registry service is a list of ID and role providers.

Monitoring Service is in charge of monitoring the respect, by the different services, of the Service Level Agreements (SLAs) declared in the Service Agreements. Its development is planned for the future (i.e., it has not been included in the current services), as standards and technologies for the definition and the enforcement of SLAs (e.g., WSLA or WS-Agreement) are not yet considered mature.

In addition to the previous components, a set of (soft) services, i.e., functionalities that need to be provided through different tools (either software or managerial) in order for the infrastructure to be effective, have been defined:

• **Qualification services** for both the repositories and the gateways, i.e., coded procedures for certifying that the components are compliant with the SPCoop technical rules.

• The management of the whole infrastructure.

Service Agreements

A service agreement is a well-specified XML document that regulates the relationships of an application service between a supplier and a client in the following aspects: (i) service interface, (ii) conversations admitted by the service, (iii) access points, (v) Service Level Agreements (SLAs), (v) security characteristics and (vi) descriptions of the semantics of the service.

248

The formal and well specified nature of the service agreement has been done to support the development and the life-cycle of services in a (semi-)automatic way. Moreover, the public nature of the service agreement makes easier the establishment of domain ontologies that allows to aggregate services with similar semantics. Finally, in the context of a set of public administrations (i.e., a Cooperation Domain), services can be composed and orchestrated, thus generating other services described in turn by service agreements.
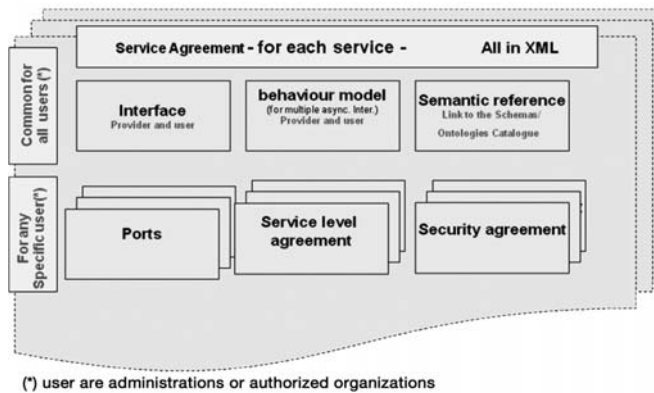

Fig. 5 – The structure of a service agreement

The application services are supplied/used through Web service technologies and standards "*enforced*" by public service agreements. WSDL can be (and is actually) used to describe the elements (i) and (iii).

The element (ii) is considered as a typical application service requires multiple interactions between the service supplier and the client, and not all the offered operations are invocable in every step during the interaction. Thus, in order to use the service correctly (and therefore to develop correct clients), it is important to know in which steps operations can be invoked. This is different from the description of the internal process of a service, i.e., the description of the workflow implemented by the application service to offer such operations; nevertheless such conversational protocol can be obtained from the internal process by making abstractions in order to eliminate the details (internal view) while focusing on those service functionalities that are visible outward (external view) [3,4]. The model that describe the conversation protocol through a Finite State Machine [5], is considered meaningful and simple at the same time.

Nowadays it does not exist a standard in the Web Service arena having the characteristics needed to describe this element, and therefore a new language, specifically designed for this purpose, has been introduced, namely WSBL (Web Service Behavioral Language), stemming from previous standard proposals (WSCL - Web Service Conversation Language and academic ones (WSTL - Web Service Transition Language). When in the future, new standards or existing one will mature and will be appropriate for describing such an element, then the SPCoop rules will be in turn evolved by incorporating them.

As far as points (iv) and (v), their importance is related to the particular scenario: application services that offer to citizens and enterprises operations belonging to the administrative/bureaucratic field, have to declare the supported levels of quality and of security. Again, at the time of this writing, standards in these fields are not mature yet, therefore the filling out of these parts is not mandatory. The accompanying measure project ICAR is currently investigating these issues.

The last point (i.e., (vi)) is introduced as, in an e-Government scenario, many concepts that should be shared and universally accepted, conversely show deep differences of meaning among different cooperating subjects, presenting different descriptions and formats. As a result, the description of the conceptual schemas and the ontologies related to the information carried out by a service, have the same importance of the definition of the interface.

Proposals for the description of these aspects are rapidly emerging; but the proposals related to OWL and/or WSML/WSMO (the so called Semantic Web) are not yet considered as standards, and their relationship with Web services and the related standards is under investigation.

The ambitious aim is to have, in the near future, as few ontologies as possible, through which to describe the semantics of all the application services offered by the different administrations.
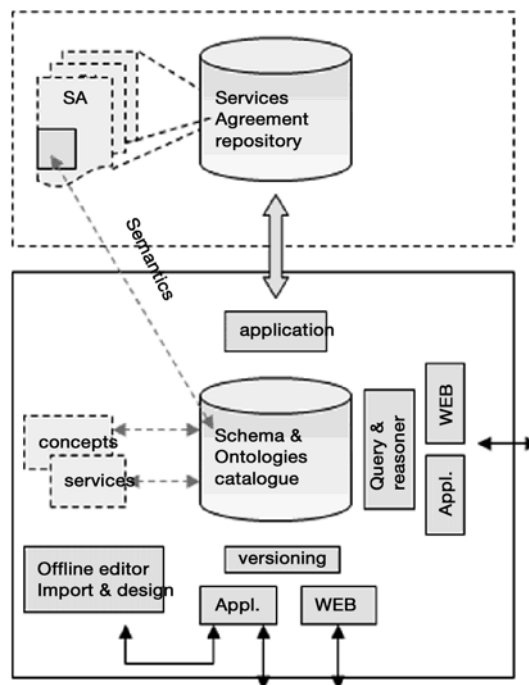

Fig. 6 – The schema & ontologies service
Cooperation Domains and Cooperation Agreements

A Service Agreement describes a 2-party collaboration/cooperation, with a subject offering a SPCoop application service and another subject using such a service.

A lot of administrative processes do not concern only a single administration, but they involve different subjects.

The Cooperation Domain is the formalization of the wish of different subjects to join in order to cooperate for the automation of administrative processes.

Inside the Cooperation Domain, a responsible coordinator should be identified, it assures the organizational and technical effectiveness and the coordination of all involved subjects and of the set of composite application services supplied outward by the Cooperation Domain.

The Cooperation Domain is seen outward as a service supplier acting like a normal domain of a single administration; the main difference is in the way its services are designed and deployed: in the Cooperation Domain they are built by composing and integrating simple services offered by the involved administrations; whereas for the single domain the supply of a service is related to applications that are fully under the responsibility of the single administration.

A Cooperation Agreement represents the specification of application services offered by a Cooperation Domain. The service supply is characterized by three basic elements:

• Application services offered outward by the Cooperation Domain. From the user point of view, these services (composite services) are identical to any other service directly offered by a Domain, and like them they are described by a Service Agreement.

• Application services used internally by the Cooperation Domain to build the composite services, referred to in the following as component services; they are described by their own Service Agreements too.

• The specification of the way the component services are coordinated to build the composite service. This specification, needed for each composite service, can be defined either in terms of orchestration (i.e., from the point of view of the composite service, by describing the process for the composition and coordination of the component services) or in terms of choreography (i.e., by an external point of view, by describing the constraints on the messages exchanged among the different component services). In SPCoop, the first solution, through the use of WS-BPEL, has been preferred.

  Therefore a Cooperation Agreement consists of (i) an institutive document, expressed in natural language, describing the purposes and the normative or institutional basis of the Cooperation Domain; (ii) a set of references to the Service Agreements, describing the composite services offered by the Cooperative Domain; (iii) a set of WS-BPEL documents (one for each composite service) describing the coordination processes among component services; such documents can be processed through suitable orchestration engines that are able to automate the coordination and the supply of a composite service; and (iv) a set of lists of references to the Service Agreements describing the component services (a set for each composite service).

251

Repositories for Agreements and Schemas/Ontologies

SPCoop provides an infrastructural software component to register and to maintain Service (and Cooperation) Agreements it can be defined as the database of the cooperation. This component offers functionalities for the registration, the access, the update and the search of the Service/Cooperation Agreements.

The UDDI standard is the starting point to define and implement this component; but this standard does not offer all the required functionalities, in particular UDDI defines content-unaware queries, while the Repository will offer the capabilities for queries about the content of the Agreements.

Therefore, specific software layers have been designed to extend UDDI in order to realize all the envisioned functionalities. From a deployment point of view, the Repository has been organized into two layers, namely General and Local.

In particular, it is organized in a distributed master-slave architecture with replication of information with the following structure: (i) a singleton instance of the General Repository contains all the information needed for the supply of the provided functionalities; (ii) N instances of the Repository, referred to as Local Repositories, contain (sub-)sets of information, defined according to different rules (e.g., geographic location, functional relationship, relationship with the supplier): if an information is in a Local Repository, it is surely in the General one, while the viceversa is not always true.

Updates can be performed either at the level of General and Local Repositories, and a synchronization mechanism based on Publish&Subscribe technologies has been devised in order to guarantee the correctness of all the Repositories. 9 Further evolutions of the Cooperation Agreement will consider the specification of the documents describing the choreographies.

The Schemas/Ontologies Repository is the software component offering functionalities to deal with service and information semantics, in order to find out services that are more suitable to provide required functionalities.

As described in service agreements section, the "*operational*" point of view for the provided services is not the only possibility, being sometime better to search a service on the basis of the type of information that it carries on/deals with.

The ontologies and the conceptual schemas represent the mechanism to describe this aspect, and suitable technologies, commonly referred to as semantic ones, allow the achievement of (semi-)automatic reasoning on the basis of such information. Even if the semantic descriptions are part of the Service Agreements, they are more effectively managed as separate elements.

Therefore the Schemas/Ontologies Repository acts as a structure to store ontologies and conceptual schemas, offering functionalities of registration, access, update and reasoning on them; it is, in fact, the "*database*" of the ontologies and schemas. Figure 6 shows the complex architecture according to which Agreements Repositories (one General and various Local) and the Schemas/Ontologies Repository (unique in SPCoop) are arranged in a distributed fashion.
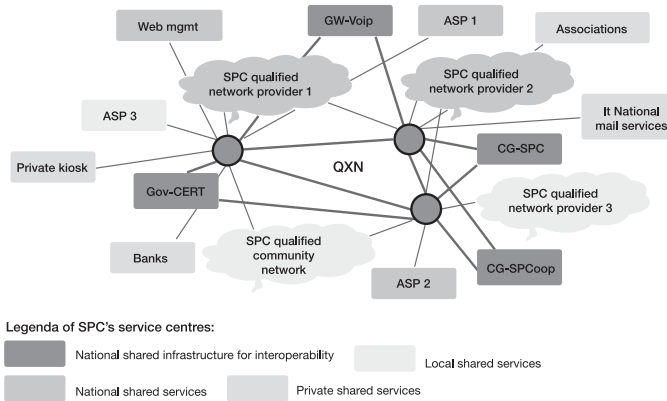
Fig. 6 – The use of SPC for shared and PPP services

ACKNOWLEDGMENTS

REFERENCES

[1] Batini, C., Mecella, M.: Enabling italian e-government through a cooperative architecture. IEEE Computer 34(2) (2001)

[2] Alonso, G., Casati, F., Kuno, H., Machiraju, V., eds.: Web Services. Concepts, Architectures and Applications. Springer Verlag (2004)

[3] Dijkman, R., Dumas, M.: Service oriented design. a multi-viewpoint approach. International Journal of Cooperative Information Systems 13(4) (2004)

[4] Vetere, G., Lenzerini, M.: Models for Semantic Interoperability in Service-Oriented Architectures. IBM Systems Journal 44(4) (2005) 887 – 904

[5] Guijarro, L.: Interoperability frameworks and enterprise architectures in egovernment initiatives in europe and the united tates. Government Information Quarterly 24(1) (2007)

[6] European Commission: Interoperable Delivery of European eGovernment Services to Public Administrations, Businesses and Citizens (IDABC). (http://europa.eu.int/idabc/)

[7] prime minister's decree with technical rules of SPC 2007-0676-I- EN http://ec.europa.eu/enterprise/tris/index_it.htm

253

Exploitation of Digital Contents for the Public Administration

Giulio De Petra, **Fabrizio Gianneschi, Giaime Ginesu**
DG Technological Innovation,
Regione Autonoma della Sardegna
Cagliari, Italy
{gdepetra, fgianneschi, giaginesu} @regione.sardegna.it

ABSTRACT

In this paper, we describe the experience of Regione Autonoma della Sardegna related to the exploitation of digital contents. Since 2005, the regional government has been developing projects to promote the publication of any form of culturally relevant content through its institutional web-portals. Such project implied both technical, organizational and economical challenges, and has now reached maturity.

Through the adoption of state-of-the-art technologies, ad-hoc organization and the contribution of multidisciplinary experts, the Institution is now offering its Digital Library though the www.sardegnadigitallibrary.it portal, together with its global portal systems.

KEYWORDS

Digital contents, digital libraries, public administration, cultural heritage, institutional web

INTRODUCTION

The Information Society brings a wealth of benefits to the civil society and its citizens such as more efficient companies and administrations, a more creative working life, improved healthcare and better education and training. These benefits all derive from digital content and services. The old "information is power" adage is proving increasingly correct as the information society carries on its relentless development.

Access to information raises the wall between those who are able to retrieve relevant data and the others who are not. The process of digitization and open publication of any kind of digital contents, and, in particular, in the areas of public interest, such as geographic information, culture, science and education, represents an important approach for lowering such barrier.

The Public Administration, which detains the mission of pursuing the public good and promoting the knowledge diffusion, could be a key player in the implementation of such challenge.

In this paper, the theme of digital contents exploitation is investigated in the context of the Public Sector. The case of Regione Autonoma della Sardegna is reported as an example of successful experience that involved careful planning, collaboration and development of a state-of-the-art system.

The paper is organized as follows. The Introduction describes the object of the work together with several factors which brought to the adoption of the devised plan. In the Background Section, a brief analysis of digital content exploitation through current web technologies is provided.

In Section "Digital Contents for the Public Administrations", the problem is analyzed with respect to the structure and needs of the public administration. The specific case of Regione Sardegna is discussed in the "The case of Regione Autonoma della Sardegna" Section. Finally, the conclusions are drawn.

Broadband availability

The ever increasing availability of broadband connection is allowing for the transmission of larger data payloads, thus favoring the exchange of complex multimedia formats such as streaming video or the development and publication of interactive web services.

As shown in Fig.1, the global Internet traffic has been growing exponentially, mainly thanks to the great advances in network technology. Of course, data connectivity gained popularity both thanks to the availability of better technology (table 1), the drop in connectivity costs and the various service providers offering bundled offers, such as 'triple play' (voice, broadband and TV).
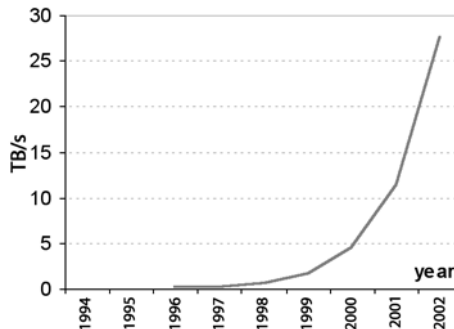
Figure 1. Amount of worldwide backbone traffic estimate

DSL played a central role. Figures from 2004 to 2006 [1], for instance, report a DSL increase at the expense of other technologies. The DSL share of fixed broadband lines was 80.4% compared to 16.8% of lines provided by cable and 2.8% by other technologies. DSL lines grew by 61.5% in such period, compared to a more modest 39.2% increase in cable modem subscriptions.

Table 1. Evolution of consumer home connectivity

Technology	Year	Speed (bit/s)
Dial-up V.2	1980	1.2k÷2.4k
Dial-up V.3	1981	4.8k÷9.6k
Dial-up V.32bis	1991	144k

Dial-up V.90	1999	56k
ISDN	1990	144k (base)
ADSL	1993	640k
ADSL	today	2M÷10M

Multimedia formats

The evolution of multimedia formats capabilities is another key player. In fact, digital contents of any kind should be supported through efficient representations. Standardization has a fundamental impact on multimedia content development and transmission. Most current formats rely on specific representations allowing for content fidelity, data compression and robustness to transmission errors. The case of JPEG image coding is emblematic. Since its launch in 1992, both the industry of imaging and the diffusion of visual data through the Internet have grown exponentially. In the following, several media are considered.

Figure 2. Multimedia formats distribution in the internet (Google search)

256

Documents. Are possibly the simplest digital content. While originally represented as plain text through simple ASCII coding, digital documents are now hypertext allowing for graphics, indexing and conditional editing. The PDF format [2] has achieved the standard status and is inde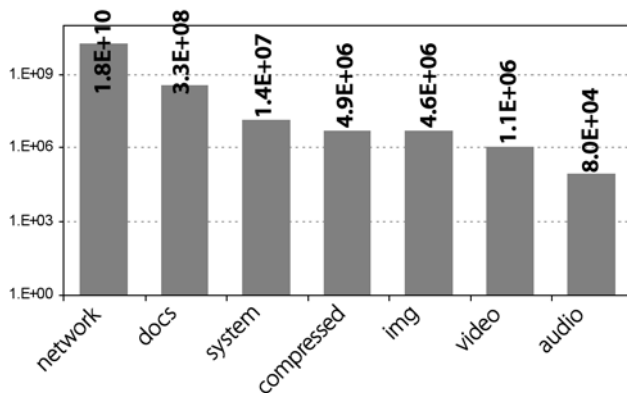ed the most recognized document interchange format. The Open Document Format (ODF) [3], together with the recently standardized and long debated Microsoft' OOXML [4] should also be mentioned.

Audio [5-7]. Music and speech are represented both though lossless (without information loss) and lossy (with information loss) formats, such as WAV or MP3. lossy compression generally relies on the suppression of inaudible frequencies or dynamics.

Images [8-10]. Pictures and graphics are among the most relevant digital contents. Digital raw pictures consist in numerical matrices, representing light intensity values in the two-dimensional space (pixels). Color digitization generally employs 24bpp or more. Image resolution is an important factor, together with signal quality, measured in terms of signal to noise ratio (SNR, PSNR). While lossless compression (entropy-based) is adopted for high-quality imaging, lossy coding is fundamental for efficient storage and image transmission. There exist a number of recognized image formats, such as GIF, PNG, TIFF, JPEG, JPEG2000, etc. Among these, JPEG is indeed the most used standard format

Video [11-13]. Video contents are generally represented through the family of MPEG (2,4) and H26x standards, often encapsulated in other container formats for streaming and playback, e.g. AVI, FLV, Quicktime. Resolution may vary between tiny QCIF (176x144) to HDTV (1280x720), while framerate is generally between 15 and 30fps. In the video case, visual quality is less important than for images, even though image sequences are indeed the most complex and demanding media. The streaming feature is common to all media that require a temporal fruition (audio, video), although it is particularly relevant in the video case. In fact, streaming implies the best tradeoff between available bandwidth, signal quality and service level.

Interactive contents [14-16]. This class comprises all multimedia formats that allow for any form of user interaction. Typical examples are virtual tours or panoramic views. Such contents often imply the use of 3D models and generally require some applet or client software in order to be used.

Web applications

With the introduction of information technologies, both private and public organizations have gradually joined the process of digitization and de-materialization of documents and processes. Actual systems supposedly allow for the management of any informative source or process without the use of physical support. Anything, from work shift timesheets to computer tomography data can now be acquired, stored, processed and shared though numerical systems and applications.

The development of software applications had a relevant role in the achievement of such results. Starting back from batch processing, the software scenario is now prevalently aimed at online applications.

The idea that any software could be developed in the web context has brought to the outburst of information availability, interaction, cooperation and ubiquity. Nowadays, the average end user is capable of searching for data, contributing personal contents, and interact either for business or entertainment purposes, virtually from anywhere, though software ranging from DMS and HRM applications to MMORGs (Massively Multiplayer Online Role-playing Games).

The actual trend is to implement technologies and web designs aimed at enhancing user creativity and content generation, information sharing, and the collaboration among users. The so-called Web2.0 movement gave birth to a number of social-networking sites, wikis, blogs, and folksonomies, supplying the ever increasing requirements for the development of new web technologies, from programming languages to communication protocols.

BACKGROUND

In the early years of the digital revolution, only the professionals were in charge of the creation and delivery of contents, due to the high skills and resources required. Thanks to the maturity of the Internet as a whole and the progress in broadband availability, recent years have seen a tumultuous development of production, distribution and consumption of digital contents.

The protagonist of such change was certainly one: the user. Thanks to the accessibility of new technologies and the reduced costs of new enabling devices (cell phones, photo / digital cameras, programs photo and video editing software) users began to contribute on activities that were extremely complex in the past. The result was the proliferation, on the web, of specialized portals, huge containers of text and multimedia contents. Portals that are both the starting and ending point of their contents, generating a virtuous cycle that feeds itself very fast. Many users don't feel those platforms as simple technical tools; they really like to be included, and benefit from the increased visibility. In fact, thanks to the media evidence provided through such mechanisms, a lot of people are emerging as real phenomena [17].

Recent data [18] show how sites like YouTube and Wikipedia are now permanently in the top 10 most visited sites in the world. Flickr, SlideShare and Photobucket are other highly successful and profitable examples following in order of investments and frequent financial acquisitions [19,20]. The web trend is well established. Considering the case of a centenary institution like the Encyclopaedia Britannica, on one hand, they are moving online most of the business, and on the other hand they are promoting the sharing of their contents through personalized web pages, free for the users [21].

However, a complete analysis of the success of web digital contents cannot be limited to the big players' cases and their numbers. There is the need to consider also other important aspects like quality as well as copyright issues. Quality assurance is one of the most controversial factors. The nature of the Internet is to provide a lot of materials, but often leaves its consumers without a qualified guide. Who ensures the correctness of the source? Who can warn us about a low quality content or, if possible, about an even more dangerous one, offending the morality, religion or minorities? Of course, this cannot be

done without controls at the source and a lot of money. Luckily, the network itself developed several ways to evaluate digital contents. Collecting the user's feedback is the most practices way to ranking contents. Digg.com [22] is probably the most successful feedback website that allows users to give a positive or negative vote to text, images and multimedia available on the Web. All these systems are highly questionable, but at the low end they provide a valid meter to judge contents that, politically correct or not, deserve to become popular.

Talking about copyrights, it is important to notice that all the above biggest success stories come all from the private sector. Almost all belong to companies outside the European jurisdiction, far enough to not obey to EU laws. Furthermore, by definition the network decouples the content producers from the companies where contents are stored. At the end, this model gives only to a few players the commercial earnings of what all the rest of people are doing.

Some critiques are emerging on this mechanism and on the ownership of our data on the long term. [23] Taking it to the extreme, due to unilateral license restrictions, international crisis or censorship, things that we can do today on our data might not be feasible tomorrow. [24].

DIGITAL CONTENTS FOR THE PUBLIC ADMINISTRATIONS

As public entities, Public Administrations should not compete with the private sector on the same market and with the same objectives. For example, investing huge resources to manage large datasets of digital contents only to generate traffic on institutional portals can be a wrong choice. Instead, PAs are a useful and valuable complement to private companies, which rarely feel the protection of the minorities, the common good and the quality as a mission to fulfil. Dealing with content production, it is important to underline that the PAs are one of the richest sources of contents. Countries like Italy, which hosts a significant portion of the world's artistic heritage [25], are also characterized by a multitude of local traditions and particularities. Administrations may then become both the certification authorities and primary producers of digital contents.

Original contents, in their master form, often lie inaccessible to the public, due to weak maintenance conditions or constraints. The digitization process, apart from preserving the contents condition, also offers the enormous benefit to allow for the contents public fruition. Such practice can generate additional value: on the one hand, the gained popularity of a new digital content can bring in new public or private investments, contributing to its preservation; on the other hand, it can create new business opportunities for the development of the local territory. In short, the above digitization strategies undoubtedly offer an opportunity of using public funds for the public good.

Among their duties, the PAs should protect minorities, both cultural, linguistic or religious. Therefore, the availability of digital contents and the web publishing of pictures and multimedia material can really help to preserve the memory, enhancing the unique and historic aspects. The production of such material is expensive, and usually the private sector is not interested in investing resources to satisfy limited minorities. Talking about quality, the role of Public Administrations is very important, since they have the

259

role of certification authorities by definition and can also collaborate with a large set of other public actors such as universities, museums, ministries, local municipalities and public media. Very few private companies can provide such an influence, and this should be properly exploited.

Best-practices

Best practice examples generally derive from the effort of cultural and social Institutions or from the academic research projects. However, there can be found several excellent frameworks resulting from the work of private companies that build their profit on information management or from the effort of individuals who develop specialized digital contents. In the following, some relevant examples are provided.

The Project Gutenberg [26] is the first and largest single collection of free electronic books, or eBooks. Michael Hart, founder the Project, invented eBooks in 1971. The project has a collection of over 100,000 titles available through its partners, affiliates and resources. Another noticeable example is the Million Book Project [27] by Carnegie Mellon University School of Computer Science and University Libraries. Together with government and research partners in India and China, the project is scanning books in many languages, using OCR to enable full text searching, and providing free-to-read access to the books on the web. The scanning of 1 Million Books has been completed the entire database is accessible through the web portal.

The DELOS project [28] started in 2004 as a 4 years Network of Excellence (NoE) on Digital Libraries partially funded by the European Commission 6th Framework Programme within the IST programme. Its vision is that digital libraries should enable any citizen to access all human knowledge any time and anywhere, in a friendly, multi-modal, efficient and effective way. It promotes interaction and collaboration. Its main accomplishments are a digital library reference model and management system.

The MICHAEL and MICHAEL Plus EU projects [29] projects focus on the integration of national initiatives in digitization of the cultural heritage and interoperability between national cultural portals to promote access to digital contents from museums, libraries and archives. The projects resulted in a data model, an open source platform, interoperability protocols and a European search portal. A good example of multimedia library yet to be launched in November 2008 is the Europeana project [30], a digital library funded by the eContentplus Community programme intended to host Europe's greatest cultural collections. The 2-year project which started in 2007 has the objective to produce a prototype website giving users direct access to some 2 million digital objects, including film material, photos, paintings, sounds, maps, manuscripts, books, newspapers and archival papers, to be selected from what is already digitized and available in Europe's museums, libraries, archives and audio-visual collections. Among other Italian examples, RAI, the national public broadcaster, has published rai.tv and rai teche [31], the online platforms for the publication of its multimedia catalogue. The websites currently host tens of thousands of videos through an advanced web2.0 interface. The cultural portal of Provincia Autonoma di Trento [32] is another Italian example, which allows to browse the complete catalogue, with sample images and audio tracks.

Finally, a peculiar example is given by the International Music Score Library Project [33], which aims to gather all public domain music scores, in addition to the music scores of all contemporary composers who wish to release them to the public free of charge. The project, started in 2006, has now a collection of 11,109 works and 18,584 scores. IP and DRM

From the Administration's point of view, the online publication of both cultural and administrative contents not only responds to the mission of transparency towards the citizens, but achieves the higher goal of promoting the local culture.

Through the digital media, data con be easily stored, processed and exchanged. However, since the copyright owners generally aim at making some profits through the licensing of their productions, such sharing paradigm is often seen as a threat rather than an opportunity. In fact, while the copy of analog data was partly limited by its same nature, digital sharing implies the reproduction of virtually identical copies.
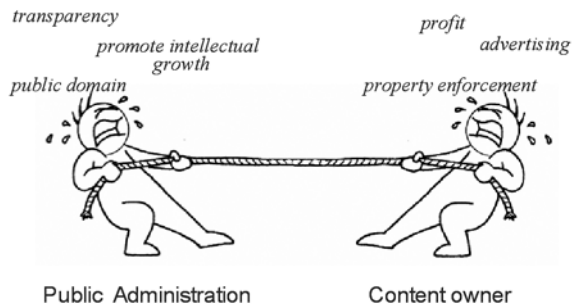
Figure 3. The antithetic pull of content publication.

The issues related to property and protection are then fundamental in the design of an institutional system for the fruition of digital contents.

The copyright and related rights legislation [34-40] differs from country to country although several harmonisation attempts have been done.

In general, given that the acquisition of digital contents must follow from a process of negotiation and agreement between contents owner and administration, there can be three complementary solutions to the property issue:

- Creative Commons [41]. The first approach requires the recognition of the right to access cultural information as part of a universal right to knowledge. Such model involves the balancing between economic interests of content creators and distributors and the public interest to gain access to knowledge. The adoption of recent open licences, as in the case of CC, significantly simplifies the work of content management and dissemination. Through such licenses it is possible to unequivocally state the content ownership, reproducibility, and distribution. In the CC case, licensing ranges from simple attribution to the tagging with "share alike", "no derivatives" and "no-commercial" properties.

- Digital Rights Management [42, 43]. Such term refers to any combination of hardware and software technologies allowing for the controlled distribution of digital contents. A DRM system provides the instruments for the enforcement of property protection by controlling the access to digital media and limiting its usage. Former implementations have focused on the copy prevention problem, while more recent frameworks allow for more sophisticated and modular functionalities, depending on the specific management models. Examples of DRM techniques are data encryption, scrambling digital and watermarking. Modern non-invasive DRM systems should be applied whenever intellectual property issues become problematic and require a rigid solution.

- Fair Use [44]. The reproduction and distribution of digital contents might be authorized, in some particular cases, depending on its aim and the quantity and quality of the reproduced data. In fact, the non-profit reproduction for educational purpose may be accepted. Similarly, incomplete contents might be distributed, given that only a small part of the original data is reproduced (as in the case of books) or a low quality copy is provided (as in the case of low-resolution images). Such practice is related to the consideration of the low commercial allure of the reproduction, which does not harm its "official" commercialization. The much discussed Italian decree DL S1861 [45], for instance, states that low resolution or "degraded" versions of music or images might be published online for free, for educational or scientific purpose. However, since the distinction between fair use and copyright violation might still be controversial, the fair use option is only indicated when its application is unmistakably unambiguous.

THE CASE OF REGIONE AUTONOMA DELLA SARDEGNA

The Autonomous Region of Sardinia has always had a great tradition in financing cultural initiatives, but only since 2005, in conjunction with the renewal of its institutional site, a marriage with the philosophy of openness and sharing of its digital materials has been started using the web as the main channel.

The Region started this change by publishing online some of its digital contents, at that time composed mostly of simple galleries (image and movies).

All contents had good quality, but were not supported by a specific informative system. To achieve that goal, a 2.8M? specific project was started [46].

Thanks to the Integrated System for the Management of the Cultural and Environmental Regional Heritage, the Administration commissioned the following activities:

- The creation of a new system for the management of the Regional Catalogue of the cultural data, compliant with the national standards [47] and integrated with all the regional cartographic systems. This activity had also the goal to publish the whole catalogue on the Internet, literally opening a treasure that has always had a great scientific value, but also suffered of a poor recognition and visibility to non-academic people.

- The creation of digital services to support the management of cultural activities, such as the promotion and cooperation between Sardinian museum, e-business, reservations, thematic databases.

- The creation of a dedicated web portal.

- The creation of a database specifically designed for the cultural sector.

All the above features shared a unique web portal as the single access point, launched in 2006 under the name of SardegnaCultura [48]. The portal offers a wide range of materials about the Sardinian cultural heritage by collecting text, images, video and audio. The user interface is focused on local themes like the Sardinian identity, the Sardinian language, traditions and events.

In parallel to the acquisition of existing contents already available in digital form, the Region has also issued a first call addressing the digitalization of other sources. The SADEL project [49] made available almost 1M? to Sardinian municipalities for the digitization of culturally relevant contents concerning the historical memory and the regional identity. Many of those sources (old pictures, books, etc) were in very bad state of conservation and under a high risk of damage. The main condition imposed by the call was the availability of all collected data to the Region, without any time limit, in order to publish them for free through the public regional channels, starting from the cultural web portals. The call fixed also some minimum technical requirements, such as:

- Availability of high-quality master copies (600dpi, true color, lossless format) and metadata under the MAG scheme [50].

- Presence of text and descriptions suitable for the web for each content.

Given the success of the above initiatives, during the following years the Administration has continued collecting (for free or not) more contents through other calls, financing also the creation of a specialized course about "Interaction Design for the Production of Digital Cultural Contents" [51].

This 13-months-long course is designed to train specialized people in the industry of the digital contents, in order to settle the results of all the running initiatives in the territory. However, the increased availability of digital contents brought also a new need: the development of a single container robust enough to store and index every digital content in an efficient manner, and capable to provide all the data at the same time though many channels in different formats. A tool designed with advanced geospatial, correlation and search functions, able to handle all the copyrights issues as well as updated to the state of the art of coolest web technologies, such as podcasts and RSS feeds.

The solution, launched in April, 2008, was the Regional Digital Library (www.sardegnadigitallibrary.it) a project financed by EU funds under the Measure 6.3, Action H of the POR Sardegna 2000-2006.

The contents of the library come from the other thematic regional web portals but also from valuable sources like the Istituto Luce, Rai, Isre, Esit and Ersat, as well as by individual Sardinian authors. All the videos, audio files, images and publications are browsable by category and subject.

Technology

The physical layer is based on an original project with a dedicated server farm made of 20 servers, with Intel technology and Windows 2003 Server/Red Hat Enterprise Linux. The hardware infrastructure (Fig. 4) has been designed to guarantee performance, security, scalability and data recovery.

The front-end resides in a DMZ Lan, which hosts the Web Cache, FTP and Proxy Server and Web Server. A secure CED Lan constitutes the back-end Cluster, hosting the database, application and middle servers, the portal application server and the backup and NMS servers.
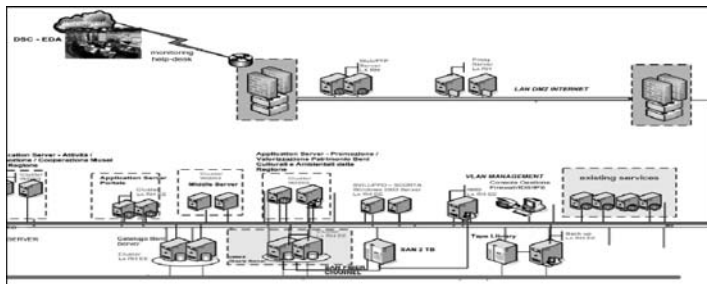

Figure 4. hardware infrastructure

The application layer has been developed following the web-based architecture through web services (SOAP protocol, XML, BPEL). Open-source components have been favoured, based on both J2EE and PHP. From a funcional point of view, the DL framework is represented in Fig. 5.
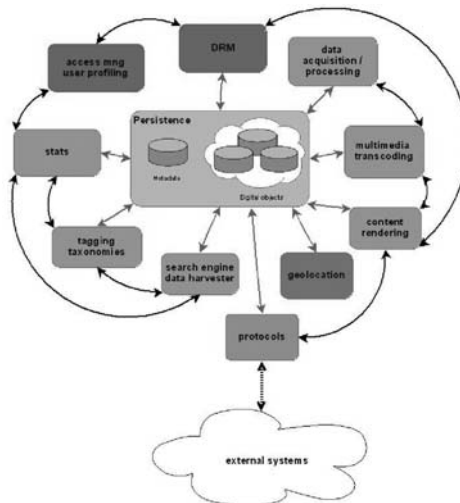

Figure 5. DL functional scheme

Organization framework

Under the organizational point of view, the Digital Library project collects and summarizes all the experiences made by the Region during the past years. At first, the Administration decided to preserve and grant the consistency of the overall front-end presentation, keeping it aligned and coherent with the suite of regional portals. Such choice has proved to be, since the beginning, a key factor for the success of our Administration's portfolio.

The library is well integrated with the institutional portals, since it collects all the data and communicates with all the other thematic sites, which act as sources and exhibitors of partial contents at the same time. The Digital Library shares most of the regional styles, HTML and graphic layouts. Nevertheless, thanks to the underlying technology, it is able to show the users a dedicated and rich interface, designed for the delivery of complex multimedia contents. All the graphics, texts and all aspects of the presentation are managed by a central team of dedicated people, who work on all the regional portals, as well as the contribution of many external collaborators. This allows them to benefit from the shared knowledge among the various involved professionals (graphics, editors, web designers, etc) but also to better respond to the users needs. In fact, the central team has the responsibility to collect all the feedback and other fresh new contents coming by citizens, companies and others Administrations. Finally, as already anticipated, the Region has made and continues to make substantial investments for the acquisition, in free or paid form, of digital contents through new calls and public initiatives.

Results

SardegnaDigitalLibrary is the most visible result of the devised architecture (www.sardegnadigitallibrary.it). Since its publication in April 2008, it has been gaining popularity both among regional and external users. At the time of writing, its URL is the first hit when searching "digital library" through the Google search engine.

Figure 6. SardegnaDigitalLibrary homepage

Currently, the website, whose homepage is shown in Fig. 6, is hosting 1045 videos, 14609 images, 1355 audio tracks and 1607 printed documents, classified into 18 main categories. All the contents chosen for publication are high-quality and complete and supplied with a rich metadata set. A content presentation sample is shown in Fig. 7.

In 6 months from its launch, the website has reached more than 5% of the unique visitors compared to the main Regional website. On average, the SardegnaDL user totals 15 page views, spending 12 minutes on the website. For comparison, the main Regional website user totals 4 page views, spending 4 minutes.

Figure 7. Example of content presentation (image)

CONCLUSIONS

In this paper, we investigated the issues related to digital content exploitation through web-based technologies in the specific case of the Public Administration.

The experience of Regione Autonoma della Sardegna has been described as a successful example of implementation of state of the art techniques by a public institution for the preservation of local culture.

The accomplishments of the project are displayed through the institutional web portals. Although positive results are proven by the users' and expert's feedback, the project is far from completion. Rather, it represents a fast-evolving creature of the Regional administration.

REFERENCES

[1] Press factsheet: Broadband Growth in the EU, European Commission - Information Society and Media DG, 20 Feb. 2006

[2] DF/A - ISO/DIS 32000 - Document management -- Portable document format -- PDF 1.7

[3] ODF - ISO/IEC 26300:2006 - Information technology -- Open Document Format for Office Applications (OpenDocument) v1.0

[4] OOXML - ISO/IEC DIS 29500- Information technology -- Office Open XML file formats

[5] WAV - in Multimedia Programming Interface and Data Specifications 1.0, pag 56-65, IBM/Microsoft, 08/1991

[6] MP3 - ISO/IEC 11172-3: 1993 - Information technology -- Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s - Part 3: Audio

[7] OGG - Network Working Group RFC3533, The Ogg Encapsulation Format Version 0

[8] JPEG - ISO/IEC 10918-1:1994 - Information technology -- Digital compression and coding of continuous-tone still images

[9] JPEG2000 - ISO/IEC 15444 - Information technology -- JPEG 2000 image coding system

[10] HDPhoto (JPEG XR) – Microsoft HD Photo, Photographic Still Image File Format

[11] MPEG2 - ISO/IEC 13818 Information technology - Generic coding of moving pictures and associated audio information

[12] MPEG4 - ISO/IEC 14496 - Information technology -- Coding of audio-visual objects

[13] H264 – ITU-T Recommendation H.264 - Advanced video coding for generic audiovisual services

[14] QuickTime Virtual Reality (QTVR), http://www.apple.com/quicktime/technologies/qtvr/

[15] Portal site for the PanoTools group - http://www.panotools.org/

[16] ImmersiveMedia - http://www.immersivemedia.com/

[17] Time- http://www.time.com/time/magazine/article/0,9171,1184060,00.html

[18] Alexa- http://www.alexa.com/site/ds/top_sites?ts_mode=global&lang=none

[19] The Yahoo-Flickr deal - http://www.siliconbeat.com/entries/2005/03/20/the_yahooflickr_deal.html

[20] "Google To Acquire YouTube for $1.65 Billion in Stock" - http://www.google.com/press/pressrel/google_youtube.html

267

[21] Britannica web share - http://britannicanet.com

[22] http://digg.com/

[23] D.Carboni, "Open: al bivio tra software e webware" - http://www.provincia.cagliari.it/contenuti/manifestazione/31459_open-al-bivio-dcarboni.pdf

[24] Businessweek- http://www.businessweek.com/globalbiz/blog/eyeonasia/archives/2007/10/youtube_china_c.html

[25] UNESCO http://italy.comnat.unesco.org/index.php?intldCat=74&blnIsCat=1&intldLang=1

[26] www.gutenberg.org

[27] www.ulib.org

[28] www.delos.info

[29] www.michael-culture.org

[30] www.europeana.eu

[31] www.rai.tv; www.teche.rai.it

[32] www.trentinocultura.net

[33] IMSLP / Petrucci Music Library - http://imslp.org/wiki/Main_Page

[34] Legge 22 aprile 1941 n. 633 - protezione del diritto d'autore e di altri diritti connessi al suo esercizio G.U. n. 166 del 16 luglio 1941

[35] Legge 21 maggio 2004, n. 128 - Conversione in legge, con modificazioni, del decreto-legge 22 marzo 2004, n. 72, recante interventi per contrastare la diffusione telematica abusiva di materiale, nonché a sostegno delle attività cinematografiche e dello spettacolo - G.U. n. 119 del 22 maggio 2004

[36] Codice Civile, Art. 2598 c.c. (Atti di concorrenza sleale).

[37] Decreto Legislativo 6 maggio 1999, n. 169 - Attuazione della direttiva 96/9/CE relativa alla tutela giuridica delle banche di dati - G.U. n. 138 del 15 giugno 1999

[38] Directive 2001/29/EC on the harmonisation of certain aspects of copyright and related rights in the information society, the European Parliament and the Council of the European Union, 22 May 2001

[39] World Intellectual Property Organization (WIPO) Copyright Treaty, Geneva, Dec. 20, 1996

[40] Digital Millennium Copyright Act (DMCA), U.S. Copyright Office, 28 Oct. 1998

[41] Creative Commons Italia - http://www.creativecommons.it/

[42] Digital Rights Management Final Report, CEN/ISSS, 30 Sept. 2003

[43] Open Digital Rights Language (ODRL) Initiative - http://odrl.net/

[44] U.S. Code Title 17-Copyrights, section 107: Limitations on exclusive rights: Fair use

[45] Disegno di legge S1861, Disposizioni concernenti la Società italiana degli autori ed editori

[46] SICPAC- http://www.regione.sardegna.it/j/v/55?s=1&v=9&c=389&c1=1291&id=1907&b=

[47] ICCD – http://www.iccd.beniculturali.it

[48] SardegnaCultura – http://www.sardegnacultura.it

[49] SADEL- http://www.regione.sardegna.it/j/v/28?s=1&v=9&c=1425&c1=1425&id=3000

[50] MAG - http://www.iccu.sbn.it/genera.jsp?id=267

[51] Bando Interaction Design - http://www.regione.sardegna.it/j/v/55?s=1&v=9&c= 389&c1=1385&id=4620

**Deploying the full transformational power of egovernment
– collaboration and interoperability –**

Sylvia Archmann
Seconded National Expert, Austria
s.archmann@eipa.eu

Just Castillo Iglesias
Research Assistant
j.castillo@eipa.eu

EIPA European Institute of Public Administration
Maastricht, Netherlands
http://www.eipa.eu

ABSTRACT

This paper introduces the concept of transformational eGovernment, which is related to the simplification of governmental service provision by the means of technology. The paper discusses the importance of collaboration and networking as key factors in deploying the full transformational power of eGovernment. Interoperability in all its aspects appears as the main enabler to achieve its goals.

KEYWORDS

Transformational eGovernment, knowledge, skills, interoperability, organisational change.

INTRODUCTION

In a matter of a few years, the fast path of technological developments has changed the way we use computers for many of our daily tasks. Since the beginning of the 2000s there have been plenty of examples to illustrate this, such as the flourishing of web 2.0 applications (the so-called social internet) over the internet, which have rapidly gained in popularity.

These websites, i.e. *wikis*, *Facebook*, *YouTube*, etc., are 'new' in the sense that they allow better flexibility and ease of editing, in addition to great portability across platforms and systems; a fact that has been a leading reason for the substantial increase of networking and collaboration over the internet.

This has boosted the importance of the internet as a platform of growth, not only for businesses, but also for creation of knowledge[74] and civil society initiatives.Nevertheless, both civil society and the business sector have been pioneers in spreading the use of such new tools; their capacity for leading change, both technological and social, are presenting great opportunities for governments and public sector organisations, as well as major challenges.

The opportunities not only lie in the dimension of governmental or administrative activity towards the citizen, but also in the internal work of policy making, decision making and practically all aspects of collaborative work within governmental organisations [2].

Considering the impact that the use of the internet and its capacity to bring people together in collaboration has demonstrated, for instance, mass mobilisation of civil society before certain events; governments should be able to profit from this to enhance participation of citizens in public affairs, as well as closer cooperation between government and citizens.

The progressive integration of new technologies in government is one of the main leading forces for the change of paradigm, which is slowly modernising the way governments and public sector organisations conceive, organise and develop their tasks.

The concept of transformational eGovernment has its origin in this transformative capacity of ICT[75] (ICT as an enabler for modernisation). Embracing this idea, several initiatives have been launched, mostly in the form of policy guidelines.

The most well known initiative to date was presented in the UK in 2005, under the title "Transformational Government: Enabled by technology". [3]

TRANSFORMATIONAL eGOVERNMENT

In the foreword of this publication, in 2005, the former British Prime Minister, Tony Blair stated his country's objectives and expectations on transformational eGovernment, in a very illustrative way:

"The world is changing around us at an incredible pace due to remarkable technological change [...] The future of public services has to use technology to give citizens choice, with personalised services designed around their needs and not the needs of the provider."

Since the creation of the modern States and bureaucratic systems, public administration organisations have, until recently, maintained structures and working patterns built and developed around the needs of the bureaucratic system itself rather than around the citizens; thus often incurring a burden for citizens and businesses at the time of dealing with the administration.

NOTES

[74] i.e. Creative Commons (CC), a non-profit organisation devoted to expanding the range of creative works available for others to build upon legally and to share. The organisation has released several copyright licenses known as Creative Commons licenses, which allow creators to easily communicate which rights they reserve, and which rights they waive for the benefit of other creators [2]

[75] ICT: Information and Communication Technologies

The usage of ICT in public administration however, has so far had a very positive impact on the modernisation of bureaucratic organisations; a tendency that has already been noted since ICT was first introduced several decades ago.

Studies have observed and measured the impact in terms of innovation and automatisation through the presence of eGovernment; showing a positive evolution since the 1990s form of computerisation to networking and user participation in the 2000s. [4]

CHANGE OF PARADIGM: FROM eGOVERNMENT TO TRANSFORMATIONAL eGOVERNMENT

At its early stages of deployment during the 1990s, eGovernment was conceived as a tool for public administration to make government information more readily available to citizens.

This is what is known as "billboard" eGovernment, which was unidirectional (from public administration to the citizen), purely informational and without enabling service provision though electronic means.

During the 1990s and early 2000s, improvements in ICT technology, availability of broadband access and also the popularisation of the internet favoured the appearance of more advanced eGovernment platforms, especially portals, which allowed certain level of interactivity between the user and public administration. These systems expanded rapidly and became common in the eGovernment map of Europe.

At this point, stepping forward into transformational eGovernment can bring about significant benefits: on the one hand, for citizens, it can reduce burdens while simplifying the delivery of services which have an impact on their lives.

For instance, government access can be solved in a way that citizens can be granted personalised access to all services without having to know the way in which governments work or in a simplified manner (with a single login, for instance).

This, of course, means an improvement in citizen satisfaction and trust in public administration. In layman's terms, it can be said that governments are moving towards a culture of customer satisfaction.

Nevertheless, on the other hand, for governments themselves, technology opens the door to modernising the organisational culture thanks to promoting collaboration, reconfiguring of the front - and back-offices in place nowadays, moving to a more evidence-based policy making through networking, and also focusing on having more diverse personnel in public administration through a new culture of human resource management. [2]

The main three points identified as goals by the UK initiative on transformational eGovernment launched in 2005 embrace all the aforementioned goals:

• Firstly, the initiative aimed at achieving citizen-centric delivery of public services through IT, rather than service delivery designed around the needs of the authority.

Thanks to this, the government sought the experience of the customer to achieve better policy outcomes, to reduce paperwork burdens and increase efficiency by reducing duplication of work and routine.

- Secondly, the UK initiative aimed at Public Administration instances to move towards a shared-services culture by standardizing and simplifying administrative procedures, fomenting the culture of networking and collaboration and putting special emphasis on interoperability.

- Thirdly, it was stressed that there must be a strengthening of the government's professionalism in terms of planning, delivery, management, skills and governance of technology-powered and knowledge-powered change. [3]

ACHIEVING FULL DEPLOYMENT OF TRANSFORMATIONAL eGOVERNMENT

Although technology has an undeniably crucial role as an enabler for such scope of public administration modernisation, ICT itself is not sufficient. Contrarily to what is commonly believed, eGovernment is not a matter depending exclusively or solely on technology.

There is a 'human-side' that is equally or even more important than technology. With regard to achieving transformational eGovernment, organisations must undergo changes increasing focus on processes and procedures and simplification. Equally important is to boost the efficiency and effectiveness of the organisation, in order to raise productivity and reduce costs.

Maintaining the coherence between the front- and the back-offices is also a crucial matter: the reorganisation of one or both without coordinating with and taking into account the other will result in chaos rather than benefits. Lastly, one must not forget today's structures of government and administrations are complex, interconnected and interdependent.

Therefore, it remains extremely important to support collaboration and cooperation within and across different levels of government. Conversely, on those aspects referring to the context in which public administration and government are framed, there are three main groups of factors which deserve special attention when designing each administration's citizen-centric approach.

On the one hand there are the social factors such as the social and economic conditions, human habits, culture, etc. In second place are organisational factors such as the culture of data sharing, the degree of service integration, the availability of one-entry points, or the personalised approach according to individual needs.

Lastly there are the institutional factors, such as the collaboration and cooperation between public sector institutions or the holistic or disaggregated self-conception of public sector on its approach to public service delivery. All those factors determine different contexts which will require different actions in order to achieve the desired modernisation objectives. [5]

KNOWLEDGE FOR TRANSFORMATIONAL eGOVERNMENT

Organisational changes aimed at moving towards transformational eGovernment have to include new areas of knowledge and skills for public administration workers. The traditional role of governments, which had been stable for centuries, was a monopoly on all aspects of planning and development of all spheres of life in the states.

However today, national and international politics have increased in complexity, and governments become more dependent on networks and other authorities, on research or even on civil society. Even though this growing interdependence requires profound changes, many authorities today still do not have the appropriate skills, managerial and strategic aptitudes, as well as flexibility, which are required to work in this environment of greater collaboration. [2]

The New Skills are a comprehensive group of new competences and knowledge areas of special relevance for organisational modernisation.

The core of the New Skills encompasses innovation capacities, project management skills, leadership skills, contractual management, basic and advanced ICT skills, technology management and process management, information and knowledge management, communication and interpersonal skills, web editing and writing skills, flexible working methods, networking capabilities, and human resource management skills.

Those are, thus, points that have different relevance depending on both the hierarchical rank of the employees and the level of proficiency required for the fulfilment of their tasks, but which are crucial for working in interconnected and computerised environments. [5]

INTEROPERABILITY FOR TRANSFORMATIONAL eGOVERNMENT

Interoperability is one of the key issues in relation to the collaboration and networking which have been emphasised above.

There actually exist many different definitions of interoperability in relation to eGovernment, but, contrary to common belief, interoperability is much more than mere software compatibility or operability across different systems, and much more than a purely technical issue. Interoperability is also the ability of public authorities' ICT systems and business processes to share information and knowledge within and across themselves. Interoperability refers also to the means by which the interlinking of systems, information and working patterns will occur, either within or between administrations, nationally or at a European level, or even with the private sector.

By interoperability we also understand the ability of two or more systems or components to exchange information and to use the information that has already been exchanged, as well as the ability of two or more systems or components to exchange and use shared information, and to accept services from other systems and access their functionality.

In interoperability in relation to eGovernment, we can distinguish several aspects, all of which are interconnected and must be equally taken into account. Such levels are:

• Firstly, technical interoperability, which refers to the technicalities of linking computers, systems and services.

• Secondly, semantic interoperability, which refers to ensuring that the precise meaning of the exchanged info is understandable by any other application that was not initially developed for such purpose.

• Thirdly, organisational interoperability, which refers to the definition of business processes and to bringing about collaboration of administrations that wish to exchange information despite having different internal structures and processes, as well as aspects related to requirements of the communities of users.

• And lastly, governance interoperability, which is concerned with the institutional context in which interoperability is to be achieved, including organisation and management traditions shaped by factors such as culture, language, history, geography, skills and competences, innovation and availability of economic resources. [7]

Thus, interoperability must be understood as a set of factors, which enable collaboration and modernisation across and within the different instances of public administration and governments. This consideration should be taken into account when designing organisational change strategies aimed at moving towards better collaboration and networking.

Why is interoperability so important?

Interoperability is of course not an end in itself, but a tool to achieve a certain desired outcome, which in this case is a more efficient and citizen-centric eGovernment, or to solve particular problems; revealing the necessity for collaboration and closer cooperation.

Problems may have different origins: technical organisational, governmental or semantic and the way interoperability can help solving them will depend on the type of eGovernment services and the concerned area. Interoperability practitioners and industry make particular efforts in reiterating this, which they see as the basis of today's networked ICT; an environment in which services do not function in isolation or in the vacuum, but which interact with other programs and devices. Users expect ICT solutions to be interoperable with each-other, and those solutions that fail to do so become worthless.

In recent years, interoperability has become more important in being considered a key enabler for eGovernment. Following the publication of the EIF (European Interoperability Framework) in 2004, many Member States have developed their own frameworks, as well as guidelines of practice to initiate work within its administrative structures. In 2006 the EU started working on a 2.0 version of the EIF, with the objective of publishing it in 2008, in order to adapt the EIF to the technological advances and maturity of practices. [7]

At the time of identifying the benefits of interoperability for eGovernment, there are five main settings where those become obvious.

- In the first place, between the different services under the same client, namely the grouping of services (for example, according to life events or problematic situations) in order to save resources or to improve the quality of service (one-stop Government).

- Secondly, among the different stages of a supply chain that is producing one or more services, for instance, when a single service cannot be produced entirely by a single agency, there is a need for interoperability between data workflow and input from other agencies and offices.

- Thirdly, among the agencies only in different geographical areas, namely interoperability refers to the direct transfer of data from the system of one administration to another administration system (mainly geographical).

- Fourthly, among the directory services or documents, namely interoperability between local directories, common metadata about services, as well as algorithms to locate the right agency. One crucial question concerns the common descriptors for services and agencies.

- Finally, in supplementary services (identity management, digital signature, etc.). [8]

PROMOTING INTEROPERABILITY

As interoperability has become a key issue for the successful implementation of transformational eGovernment, its promotion together with sharing its key success factors and barriers has become more and more important. Understanding the factors relevant to interoperability by the key stakeholders and practitioners is necessary, since the majority of interoperability problems nowadays find their origins in the semantic and organisational aspects rather than in ICT architecture or in software solutions. Understanding what interoperability implies is more challenging than having interoperable technologies. Therefore, through the use of communities of practice such as *epractice.eu*, stakeholders can become aware of existing projects and best practices and participate in an enriching process of sharing and mutual learning.

In June 2008, EIPA, in cooperation with the Politech Institute in Brussels, launched an initiative under the name of "*Connecting Public Services Communities*", which materialised into a roundtable taking place in Bled, Slovenia, within the framework of the 21st Bled eConference.

Connecting Public Services Communities intends to raise awareness, for a community of key stakeholders from academia, public sector and practitioners, of achievements in interoperability and the subsequent development of initiatives, projects, etc, as well as to share learned lessons and experiences. The outcome of the Bled roundtable will be published in an exclusive edition of the European Review of Political Technologies[76], which will be presented on 15 October 2008 in the French city of Issy.les-Moulineaux, in the framework of the current French Presidency.

NOTES
[76] ERPT website: http://www.politech-institute.org/review.asp

CONCLUSION

This paper has reviewed how transformational eGovernment refers to a governmental and administrative culture, both in way of working, on the delivery of services and customer satisfaction. Transformational eGovernment, however, does not refer only to some particular technology which supposes an added functionality to already existing platforms, but it encompasses aspects which are technological, cultural, organisational and social.

For transformational eGovernment, the importance of ensuring interoperability lies not only in the ability to transfer and exchange data, documents and information in a fast and efficient way, but also is actually much more far-reaching, as it can enable the existence of a European-wide space of eServices.

Thus, for all eGovernment projects, either support or front-office oriented, offering an opportunity to increase efficiency and productivity of the implementing agencies, but in order to reap the full benefits of ICT projects in eGovernment, interoperability must be secured.

REFERENCES

[1] Creative Commons. (2008, July 19). In Wikipedia, The Free *Encyclopedia*. Retrieved 10:46, July 21, 2008, from http://en.wikipedia.org/w/index.php?title=Creative_Commons&oldid=226702409

[2] Tapscott, D., A. D. Williams, et al. (2007). "Government 2.0: Transforming Government and Governance for the Twenty-First Century. Gov 2.0 - Wikinomics Government & Democracy". http://www.collaborationproject.org/pages/viewpage.action?pageId=3801180

[3] UK Government (2005). "Transformational Government Enabled by Technology". C. Office. London. http://www.cio.gov.uk/transformational_government/strategy/

[4] Yih-Jeou Wang, OECD, (2006) "The Impact of eGovernment in Europe". www.epractice.eu/resource/984

[5] Oxford Internet Institute: Webcast. (2008). "Gov 2.0, or Truly Transformative Government". Retrieved 13 May 2008, from http://webcast.oii.ox.ac.uk/?view=Webcast&ID=20080125_209

[6] Luxembourg Presidency & EIPA (2005). "EU: Organisational Changes, Skills and the Role of Leadership required by eGovernment". http://www.epractice.eu/document/2935

[7] European Commission, IDAbc (2004). European Interoperability Framework for pan-European eGovernment Services, IDAbc. http://europa.eu.int/idabc/servlets/Doc?id=19528

[8] EIPA (Sylvia Archmann et al), CERTH/ITI, ifib (2007). Study on Interoperability at Local and Regional Level. Final Version. retrieved on May, 2008 from http://www.epractice.eu/document/3652

ICAR Report: Interoperability and Cooperation between applications among Italian Regions (English summary)

CISIS - Central Staff of ICAR Project

October, 2008

ENGLISH SUMMARY

PRELIMINARY REMARKS

Particular emphasis can and actually must be put on the role played by the Regional and local Public Administrations (Municipalities, Provinces and Mountain Communities - association/consortium of municipalities in a mountain area) in setting up and testing the shared infrastructure for the applications cooperation foreseen by ICAR project.

During the last years, these Administrations worked very hard to innovate their organization and promote the effective use of ICT technology as a qualifying resource for the local development, thus confirming trends and experiences already tested in other European Regional Administrations.

And this role is even more significant in a moment when the Italian Nation is deeply transforming its form of government towards federalism.

The relation between ICT technologies and the effort to programme and reorganize the Public Administration in a federate form, actually seems to be a peculiar relation allowing to state that the network technologies can be considered as "technologies supporting federalism".

In fact, we can possibly consider the transformation into a federal form of government, as an extraordinary and unrepeatable opportunity for the Italian government to reorganize the majority of the Public Administrations.

Actually 21 regional Administrations and autonomous Provinces, 103 Provincial Administrations, 8.100 Municipalities, together with a large number of actors who belong to the association world, economic and professional categories, voluntary service, public utilities and many others playing an important part in supplying a variety of services for citizens and enterprises, are involved in this renovation and are requested to perform new functions and provide new services.

The carrying out of federalism is not only a political process, or a matter of prescribing rules, but it is also the most impressive and deep process to reorganize the Public Administration engine.

It is as if the biggest Italian facility company decided to deeply rearrange its structure, by transferring the greater part of its decisional and operational processes from the centre to the surroundings.

All this can bring about great benefits, in terms of efficiency and management saving, only if the reorganization coincides with a sweeping innovation of process, service and management technologies.

In other words, if this restructuring occurs without a technological innovation, no advantages will be taken in terms of efficiency and savings, on the contrary, there will be an overall increase in costs in the public sector.

Therefore, the reorganization and innovation of the local public sector are the only ways to ensure not only the economic support to carry out federalism, but also the opportunity to drastically improve efficiency and quality in the Public Administration.

The multitude of institutions involved and the relevant homogeneity of the innovative process that are bound to be activated (i.e.: the services provided for by a Municipality are quite similar to those of another Municipality) can allow large savings, if the innovative process is run and managed by means of an intelligent planning, capable to put resources and objectives as a common factor. Today, differently from the past, we are endowed with the instrument of the applications cooperation that can make all these efforts real and effective.

Undoubtedly, the applications cooperation involves a cooperation at different institutional levels and therefore, it requires the development of projects that have a relevant importance for the Country as a whole. Moreover, it involves a complete outlook on the innovative actions carried out in the Public Administration.

In reality, during the past years, the Public Administration approach was characterized by a central-oriented attitude, which means that it always turned around the leadership of a unique organization involving the different levels, but only at a functional stage.

The applications cooperation, in general and the inter-regional in particular, can be considered as a fundamental lever to achieve results at a national level, while the availability of data and services offered by the national registry offices are the basic hub for the entire Public Administration.

The set of rules concerning the applications cooperation has been defined in the Digital Administrative Code (CAD) while, the technological specifications of the Public Connectivity and Cooperation System have defined it from a technological point of view.

The development of the applications cooperation is spreading over many different institutional levels, through a number of projects. Among these projects, ICAR holds a special position, since it is an inter-regional project setting up and testing the shared infrastructure for applications cooperation among 17 regional Authorities and 1 autonomous Province in Italy, following the national standards stated for the development of the so-called Sistema Pubblico di Connettività e Cooperazione, SPC (Public Connectivity and Cooperation System)

However, the transformation of the Italian Public Administration into Federalism is also a great opportunity for an efficient change management. It is the occasion to bring into being an organization discontinuity such as to minimise the resistance to the change that generally characterizes the structural innovation set forth by ICT.

For a Government that intends to completely reform the Public Administration process and services, using network technologies, this is the best opportunity to lay down an innovative plan within a wider and general redefinition of powers, competences and functions turned to shift coordination functions and implementation activities to the regions and provinces jurisdictions.

Gaudenzio Garavini
Vice Presidente – CISIS

INTRODUCTION

Two years' work have passed since the starting up of the ICAR project, and the regional Administrations are now evaluating how the dissemination of the applications cooperation is working in Italy and, in particular, what are the objectives still to be reached, both at national and local level, so that we can assert that the innovation process just begun is undoubtedly underway.

For the past ten years, it has been clear that the ICT systems had to become interoperable in order to make the Public Administration be seen as hard as a monolith by the users.

The efforts made, up to now, as for ideas, rules and, most of all, financial and material investments are producing the expected results to achieve services and process innovation, thus speeding up the Public Administration reform.

In conclusion, the process of knowledge increase, on behalf of the private and public world, came forward in these years; a process that is no longer a public property, but a collective, complex and open property: the result of individual knowledge and competence.

So, this report would like to give an outline of the innovative route covered by the 16 regional Administrations and the Autonomous Province of Trento, testing the technological infrastructure for applications cooperation and the so-called Sistema Pubblico di Connettività e Cooperazione, SPC (Public Connectivity and Cooperation System), on one side and a new way of facing and overcoming common problems by means of an interregional organization cooperation, on the other. These actors put into effect a knowledge sharing process through a cooperation based both on internal know-how production and on an external learning, in such a way as to bring about a significant changeover in the central and local Public Administration modus operandi.

The report is divided into two parts. The first Chapter of the first part provides an introduction on technological innovation, starting from a historic excursus of the e-government regulations in force in Italy, in order to point out the main principles of a policy of simplification, competitiveness, services tenability, back office integration, necessary to make Public Administration activities rise in value and become economical for the whole Country system.

Going through the set of laws that led to the legal establishment of SPC (Public Connectivity and Cooperation System) and the ministerial strategies put into force, we can recognize the cooperation model as the organizational and technological solution that turns out to be the best constitutional framework of the new federalism, foreseen by the 5th Title of the Italian Constitution.

The second Chapter describes ICAR project, pointing out the technological elements, the governance and the management that make it one of the national and European best practice.

In the 3rd Chapter of the second Part of the Report, the regional Administrations submit the interoperability and applications cooperation projects they are carrying out at a local and regional level, describing their information technology systems and the policies undertaken for the Information Society and e-government.

Finally, the 4th Chapter describes the experiences developed in the regional Administrations, particularly with regard to ICAR project and puts emphasis on the skills and weakness, critical factors and opportunities shared. Furthermore, it outlines the first observations on the future activities to undertake.

The report was drawn up following a methodological open approach that, though foreseeing the participation of all the members of ICAR governance, i.e. the regional Administrations participants to the project, did not mean to be self praising, omitting the events objectivity.

Consequently, we applied contextual survey techniques capable to grasp the complexity of the developing cooperation process, together with a strict awareness of ICAR interregional activities advancement situation, (activities overseen by the project central staff), and the e-government policy dynamics, (activity foreseen by CISIS statute aims).

To sum up, the report drawing up, based itself essentially on:

- Bibliography and web graphics analysis of deed, research, laws and documents necessary to contextualize projects relevant to national and regional strategies.

- Analysis of the ICAR project monitoring data, in order to provide an overall outlook of the project activities state of development.

- Analysis of the statements relevant to governance and control committees.

- The issues outcome from the national coordination groups (SPC Commission).

- The results of the brainstorming activities worked out in two years' time, by some of the key regional Administrations, CNIPA (National Centre for IT in Public Administration), Ministries, Universities, Research Centres, Consulting Companies, activities necessary to draw out the applications cooperation and interoperability development guidelines.

- Gathering of regional experiences on interoperability and applications cooperation data drawn out from a set of forms distributed to each regional Administration involved in ICAR project.

The forms were made up to:

- Place the activities in progress inside the specific laws and regulations, strategies and political outline of the territory.

- Outline the financial framework and the project dynamics.

- Point out the organizational elements of the activities and projects on the way.

- Provide a quality and quantity statement of public connectivity and applications cooperation system dissemination on the territory.

This report enabled to shed light upon the real situation of the activities evolution inside the different, but complementary regional territories, to see how ICAR project is moving, mainly with respect to the interregional activities, and to foresee a potential, probable scenery of the future policy, with a particular attention to applications cooperation and interoperability.

THE RESTRAINING AND SUCCESS FACTORS OF INTEROPERABILITY AND APPLICATIONS COOPERATION WITHIN THE ITALIAN REGIONAL ADMINISTRATIONS

1 From strategies to cooperation

The regional Administrations have submitted an outlook of the way covered in the last three years, from 2004 to 2007, facing technological innovation and Information Society development.

The activities taken up, particularly as far as applications cooperation is concerned, are the results of a determined will to pay concrete attention to information technology systems, in consistency with the national trends of the Central Government, so as to assure quality to services and, in general, to the relationships between citizens and Public Administration, thanks to the exchange of data and the unitarity of administrative procedures.

The article 12, 5th paragraph of the Digital Administration Code (CAD), provided for by the Decree-law no. 82, dated March 7th, 2005, states that Public Administrations use *"information and communication technologies assuring…the access to the consultation, circulation and exchange of data and information, as well as systems interoperability and integration of service processes among different Administrations in observance with the technological rules provided for by the article no. 71"*, and yet again the article 68, 2nd paragraph states that, in arranging and acquiring software programmes, they adopt *"digital information solutions capable to assure interoperability and applications cooperation"* according to what provided for by the Decree-law no. 42 dated February 28th, 2005 setting up Public Connectivity and Cooperation System (Sistema Pubblico di Connettività e Cooperazione - SPC).

Eventually, the article 7, 1st Paragraph of the Public Connectivity and Cooperation System foresees that Public Administrations put into operation *"in developing and managing their information technology systems, also including the organisation aspects, the technological solutions reliable to applications cooperation with the other Public Administrations, according to the technological rules…"*.

The change in the rules made by the national Government during these three years, in accordance with the regional Administrations, as for the enforcement of the e-government policy, to make the ICT technologies application, intelligent and systemic, can be considered a milestone. The above mentioned change aims at completely transforming the administrative processes making them easier and more efficient, less expensive and able to produce quality services.

Actually, the recurrent discontinuity in administrations and programmes, that marked the Country government, the slowness in defining the local Authorities system, the day after the functions and tasks devolution (Decree-law no. 112/98 and constitutional Law no. 3/2001), did not support a unitary development of the Information Society and applications cooperation in Italy and therefore, the attainment of a shared innovation.

Therefore, defining the SPC regulations and making compulsory the enforcement of the technological rules, specifically those of interoperability and applications cooperation, on behalf of the Public Administrations, is an important result.

283

The outcome of this enforcement can be found in the Government-regional Administrations inter-constitutional committees, and in the programming and planning of regional documents.

Yet, the risk that these documents, though stating the goodwill to favour the development of a territorial federate and cooperative system, do not find the due attention to put them into effect, is a quite usual Italian administrative tradition, that was largely shown, in the past years, by the different results obtained. In fact, significant experiences in basic automation process and in the accomplishment of advanced services on line, in some areas, alternate to planning deficiency and delays in other parts of the Country.

For that reason, it is convenient to avoid a gap in the unitary strategic vision of e-government and support an important project that has a relevant importance for the Country, a project that takes into account the SPC regulations, so as to bring about a structural innovation that makes *"...competitive the entire framework of the Public Administrations, without producing digital divide phenomena, and even worse, wipes out the existing ones"*. In order to make this possible, it is necessary to act on a national federal level, improving the inter-institutional cooperation based on common objectives and not on institutional capabilities.

1.1 Analysis of the regional activities

The regional Administrations that, since the beginning of e-government, decided to consider, as a priority, the implementation of information technology systems and their dissemination on the territory, took an advantage in comparison of others. These information technology systems can assure a continuous process of technological and functional development of products having a high degree of homogeneity, scalability and integration.

Since these Public Administrations are pioneers of an evolving system, they anticipated the digital divide knocking down on their territories and prepared the technological and organizational conditions to give an structured (even if not sequential) answer to the shared cooperation and interoperability adjustment process.

Though the other regional Administrations work today in a clearer and more defined normative and strategic framework, they suffer both from an organizational delay, deriving from the use of technologies and an infrastructural network, due to the lack of homogeneity typical of the broad band diffusion that bars the access to the services on line. Certainly, the projects that involve significant investments in favour of the e-government policies of these years, both in the network infrastructures and in the realization of on line services, have tendentially filled this gap, even if a difficult consolidation of a real model of a system persists.

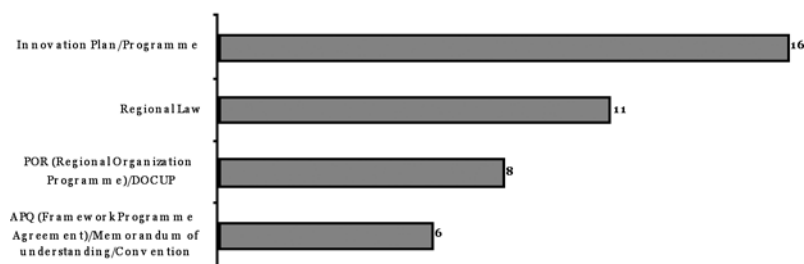### 1.1.1 The instruments

The majority of the regional Administrations showed a strong and definite determination to work together and bring about an e-government new model, especially with regard to applications cooperation. However, this attitude did not cause the same resolution to promulgate regional laws on the subject, or at least, not all the regional Administrations laid down equivalent laws.

284

Nevertheless, we can assert that, if a regional Administration issued a law on the matter, this has become the referring operational framework for the following projects.

At the same time, even if a specific regional law wasn't put into force, all the Administrations acknowledged a huge importance to programming, which often lacked in the past years, apart from the Community obligations on the matter. This pointed out a new attitude towards activity-making, not only law-making, or what is worse to a mere enforcement of higher level laws.

Picture no 11.4 *Coordination instruments realized by the regional Administrations to assure unitary and sharing to projects*

Innovation Plan/Programme	16
Regional Law	11
POR (Regional Organization Programme)/DOCUP	8
APQ (Framework Programme Agreement)/Memorandum of understanding/Convention	6

Source: *regional Administrations data processing – 3rd Chapter*

Actually, picture no. 11.4 underlines how the majority of the 17 regional Administrations arranged to plan applications cooperation projects through long-term programmes and by setting up various committees to assure project policy, management and organization (picture 12.4).

Consequently, we can assert that a programming strategy exists and allows projects to pursue a national and Community policy in order to involve local actors, and make them able to settle and build up regional development and management policies.

1.1.2 The projects

The approach of each regional objectives programming in accordance with national and European trends, can be noticed through the projects analysis developed by the regional Administrations.
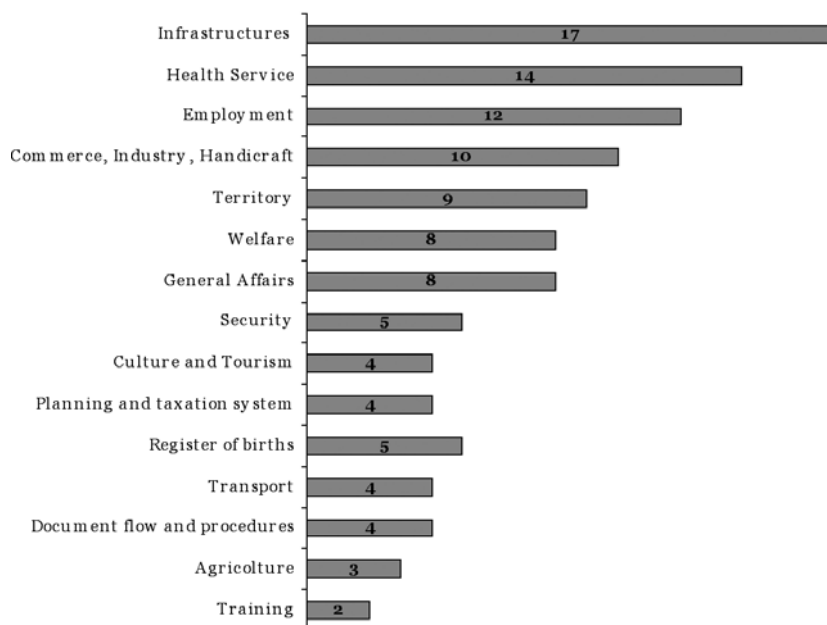
These projects can be catalogued within three strategic categories, in relation to their purpose:

• Improvement of the administrative achievement efficiency and efficacy and of the relationships among citizens, companies and local authorities.

• Work innovation and new increase perspectives in business systems, through the use of ICT tools.

• Re-balance of the territory digital divide.

In particular, the regional Administrations projects have repercussion on the following areas:

- Infrastructural: as for the setting up of a well-organized IP oriented and multichannel communication network competent to connect the different territory authorities and a set of process infrastructures supplying web services to authorities, citizens and companies.

- Technological and standards making: as for the access to services, databases and for applications cooperation according to the SPCoop model.

- Application: as for the creation of a set of services easy to be used and distributed straight through integrated communication infrastructures, able to assure many functions.

Picture no 12.4 *Distribution of the thematic areas involved in the regional projects on applications cooperation and interoperability*

Thematic area	Value
Infrastructures	17
Health Service	14
Employment	12
Commerce, Industry, Handicraft	10
Territory	9
Welfare	8
General Affairs	8
Security	5
Culture and Tourism	4
Planning and taxation system	4
Register of births	5
Transport	4
Document flow and procedures	4
Agricolture	3
Training	2

Source: *regional Administrations data processing – 3rd Chapter*

In picture 12.4, we can notice that all the regional Administrations were compelled to provide for the supply and/or the updating of their infrastructural and technological equipments, as far as security, identity access, services integration, and so on were concerned, even if at different extent, to adjust the domain application activities, according to the strategic priorities of the Administration.

As an example:

- In the Health Service: centralized booking system, numerous local services for primary health care, tele-training, laboratory reports consultation, physicians [medical doctors] networking, electronic case history, the sanitary compensations system (ICAR project- TASK AP1), birth registrations system, hospital admissions registration system, residence variation notifications, prescription-report cycle, sanitary e-procurement, and so on.

- In employment sector: accomplishment of regional information systems for the compulsory communications management, mobility and job requests and offers (ICAR project – Task AP4), job centres, and so on.

- In "commerce, industry and handicraft": services supporting SUAP (sole unit for activities production), companies' register, business ICT services.

- In territory system: land registry, information management of water resources, and so on.

Especially with regard to financial compensation in health services and circulation and exchange of private data, (see 2nd Chapter, page 61), ICAR project pointed out that the health services sector is extremely important for the regional Administrations, also from a financial point of view. Therefore, the Administrations are strongly engaged in assuring, both on site, primary care and help desk services and on line treatment booking, first aid, private data integration.

However, each regional Administration modified their interventions according to the territory requirements, thus helping in carrying out pioneer projects even at a national level, as for example the socio-medical record.

Employment, commerce and territory system themes are as much important. Besides the common interventions as mobility and employment management services, land registry, business administrative services, other experimental interventions are to be taken into consideration, as for example, the SUAP unique process, the setting on line of ICT services addressed to textile and cloths business, and so on.

At the same time, as far as infrastructures are concerned, the regional Administrations put into effect different interventions going from infrastructures construction, reinforcement and/or improvement of the regional network model, though being bound to conform their Information Technology Systems to the SPC standards. The differences in intervention are obviously due to the extent of the activities, already undertaken in the previous years.

1.1.3 The funds

The dissimilarity of the actions carried out affected the Administrations financial plans in a completely different way. In the last three years, from 2004 to 2007, the Administrations reserved funds of their budget and from the central Public Administration co-financing to an overall amount of about 1,700 million Euros and spent about 1,100 million euros, corresponding to 63% of the amount reserved.

The amounts spent by each regional Administration are quite different, according to the interventions undertaken and to the geographical and a administrative dimension (see picture 13.4).

Picture no. 1 3.4 *Percentage distribution of the total amount spent by the regional Administration with regard to the reserved funds. Fund pooling according to regional territory*

Between 1000 and 9.999 kmq
- Piemonte 25399 kmq — 65%
- Sardegna 24090 kmq — 37%
- Lombardia 23865 kmq — 96%
- Toscana 22990 kmq — 57%
- Emilia Romagna 22123 kmq — 67%
- Puglia 19358 kmq — 58%

Between 20.000 e 30.000 kmq
- Veneto 18391 kmq — 78%
- Lazio 17203 kmq — 67%
- Campania 13595 kmq — 23%
- Abruzzo 10794 kmq — 33%
- Basilicata 9992 kmq — 67%

Between 10.000 and 19.999 kmq
- Marche - 9694 kmq — 100%
- Umbria - 8456 kmq — 41%
- Friuli Venezia Giulia - 7845 kmq — 68%
- PAT - 6212 kmq — 63%
- Liguria - 5421 kmq — 85%
- Valle d'Aosta - 3263 kmq — 71%

63%

Source: *regional Administrations data processing – 3rd Chapter*

1.1.4 The paths

Actions alternation, expense variability, but also paths dissimilarity, marked the regional Administrations the previous three years' work to achieve common strategies and the implementation of the Public Connectivity and Cooperation System.

Eventually, the innovation brought in by SPC consists in having found a unitary solution to the regional and provincial polycentric network system, that had increased during the years and was difficult to be homogenized.

The organizational architecture settled by SPC foresees the creation of a community network made up by the integration of territory networks, (regional and/or provincial) differently organized, owing to peculiar internal engineering systems, but qualified according to SPC standards, to assure service level transparency to the participant Administrations.

In substance, keeping into mind the investments made, SPC wants to increase the value of the territory systems encouraging them to develop real local community networks to gather the data flows coming from all the authorities they are members of and to connect to SPC, thus building a national community network capable to:

• Work together to the development of an Internet spread all over the Country, using its technologies and patterns.

• Build a homogenous reality from the interconnection point of view.

• Base itself on a shared management policy, organized by the stakeholders.

• Dispose of qualitatively homogenous services.

Picture no 14.4 *Coordination bodies b uilt by region al Administrations to assure unitarity and sharing of the projects*
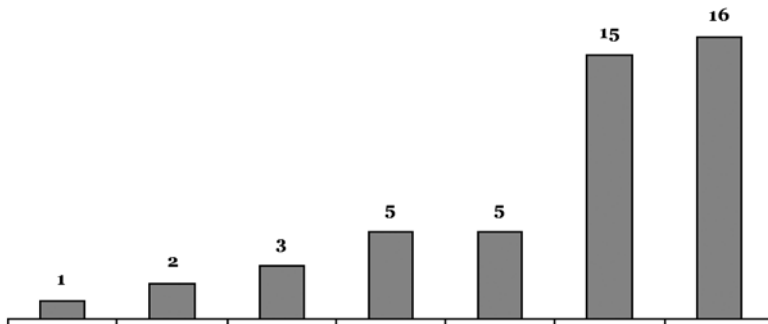
Source: *regional Administrations data processing – 3rd Chapter*

Yet, to create a community network, not only with regard to infrastructures, but mostly able to manage services, standards and exchange systems, is a real challenge the regional Administrations are going to face. The purpose to make all the local Authorities work together and to give them the same tools to do it, to be able to share excellences require a strong governance that can give everybody the responsibility to carry out a common and shared process to exalt the most remarkable experiences many local Authorities achieved in these years.

To make all this possible, legal proceedings, like memorandum of understanding, Framework Program Agreement (APQ – Accordo di Programma Quadro), regional council decisions, conventions were used and coordination committees, technical tables, leading committees, experts task forces were formed (see picture 14.4).

In particular, it came out that the small local Authorities invested on a organizational model, following the "Triple Helix" paradigm, in the shape of "laboratory", sharing culture and know-how, specific of the territory, through agreements and/or Program Agreements signed among research corporations, universities, companies able to support the interchange at different levels, like:

- Organizational, (by means of initiatives comparing management models and methodologies in strategic projects).

- Applicative, (by of sharing know-how and project analysis).

- Technological, (using comparison actions, transferring and cooperating in technologies, products and platforms maintenance).

Or in the shape of "consortium" structured according to service logic, grouping together territory skills, in relation to highly specialized themes, such as protocol, network, applications cooperation, territory information technology systems, associated operational control, e-procurement.

Other larger enterprises disposing of already developed infrastructures attended to strengthen and consolidate their leading position in handling the local public Administrations networks, putting at their disposal technological and organizational infrastructures to allow applications cooperation and interoperability, following the Digital Administration Code regulations, and consequently supporting the processes of standardization and semantic definition of services.

We must point out that the Administrations have achieved a governance process, which is a fundamental target for the regional administrative dynamics.

Most probably, the process development slowly, driven by the various laws and regulations of the administrative reorganization in the 90's, i.e., Laws no. 142/90 and 241/90 that introduced the service Conference legal instruments and the Framework Programmes Agreements. After 18 years, these instruments widespread use in the regional legal systems and helped to generate a cooperation culture inside the Public Administration.

Yet, the regional experiences give an overview on the Authorities availability to recognize that their object-planning system are shareable, which is an important step ahead for the Public Administration and the establishment of a SPC community network. And still, there's a long way to go to realize a completely cooperative model, even if this is a first step.

2. What are the sceneries?

The regional Administrations dynamism in activating and implementing the shared innovation process, especially, as far as applications cooperation and interoperability are concerned, points out that the general situation is rather positive after two years' work.

Due to its non-invasive nature, SPC represented the rallying element for an equal technological and organizational solution consenting the majority of the participants to collaborate on carrying out a unique domain of communication among the central and local Administrations.

SPC and other patchy e-government past interventions have given the regional Administrations an incentive to find out a common line of behaviour availing themselves of a representation association like CISIS (Interregional Committee for ICT and Statistics), realizing common objective projects.

ICAR project is the product of this challenge and can be shown as the concrete model of interregional coordination and created the basis for the development of new sceneries for interregional cooperation.

Actually, if on one side, ICAR spread out the cooperation infrastructure on the territories, on the other it gave confidence to the inter-institutional cooperation on which new actions and projects can be based.

Moreover, ICAR developed a model where all the participants could establish cooperation, a tie between human and professional relationships at a formal and informal level. In substance, ICAR introduced a contact between personal motivations of each actor in the regional Public Administration and organizational objectives.

Furthermore, the work carried out by the regional Administrations engineers and managers with CNIPA and the Ministries went beyond a simple material or immaterial incentive, finding in the common objective to organize the SPC community, that sociability "ethos" permitting to overstep the single person's tie with its organization and to melt in the desire of the common good. And to tell with Francesco Tortorelli's words: *"…the synergy set in between the regional Administrations and CNIPA, had and still has the need to create involvement, more than the participation, in the spreading out of the SPCoop infrastructure, to govern a large amount of technical contents, the majority of which strongly innovative, foreseen by the technological framework, to set out the technical regulations (issued on 26th June, 2008). ICAR contribution has been constructive and synergic, apart from the technical aspects, it is useful to point out the less visible, but very important contribution, i.e., the opportunity to work together on common objectives, sharing and increasing the value of the single excellence and know-how. The last one has been the best relationship between ICAR and CNIPA and showed that SPCoop dissemination requires a massive commitment, and, at the same time, a considerable cooperation capability between people and organizations involved"*.

To sum up, the organizational vision occurred overcame the institutional boundaries, the structes and relationships formalization, the use of material motivations, thus finding in the technical abilities of the actors involved, in the internal cooperation climate, in the wish to communicate and work together, in the attitude to share responsibilities and unexpected events, in the cultural tuning, in the widespread and skilful partaking of the actors to the inter-institutional thematic work-groups a new appreciation of working and cooperating together.

"However, we need to be aware of the fact that we are almost at the beginning (which cannot be detected by an outsider). At this stage, it is necessary to get faster and accelerate the applications cooperation projects that can be easily used, so that the model can be inclusive with respect to the outlying tendency, whatever the breeding reason may be, of ignorance of the rules and/or advantages of the model and its applicability, perceiving one's requirements as peculiar, standardization and interoperability not as a value, but as an impediment, and so on.

Furthermore, we need to make the model improve, including new standards, specifications and requirements, that's why we need to start new shared and parallel initiatives. Nevertheless, we shall care about knowledge communication and dissemination in all the Public Administration levels, ICT market, professions, Universities, research companies, services enterprises, Authorities, and so on. Eventually, it is desirable, if not necessary, the model should be widely spread by means of a strong commitment, at least on behalf of the SPC coordination Commission, through big national projects and should be followed by a fully developed vision of the technical regulations, standards and organizational aspects.

In accordance with these viewpoints, the regional Administrations set up ICAR-PLUS, a project depicted as a support action for the dissemination of the applications cooperation culture and enhancement of ICAR outputs in the regional territories. Since it has been active from July 2008, it is now working in every regional territory to draft a dissemination and training plan and realizing an observatory to monitor and improve the applications cooperation development in all its infrastructural, technological and organizational components.

Subsequently, shared paths have been started for the analysis and the development of interregional interoperability actions with regard to registry office (organic and systemic development of the actions provided for by the task AP2 of ICAR), documents dematerialization, taxation system, land registry, mobility information, artistic heritage.

The themes coped with, consistent with the strategic plans of the regional Administration, approved by the Unified Conference on 20th September, 2007 correspond to the priorities identified to build actions appropriate to the nation's interest, such as to bring on innovation to the whole Public Administration.

The route, the regional Administrations set out on, is based on the will to realize a national e-government founded on the objectives sharing, responsibilities settlement, coordination of the instruments that assure its practice, as well as the actions and resources integration on behalf of all the institutional subjects that can be involved.

Actually, the model of the federal government foreseen cannot disregard a network of equivalent institutional subjects and consequently, require a very strong and equivalent cooperation among different levels of government.

Therefore, the next potential scenery is characterized by the regional Administrations conscious of being a driving strength of the Public Administration innovation process, where ANCI (National Association of the Italian Municipalities), UPI (Union of the Italian Provinces) and UNCEM (National consortium of municipalities in a mountain area) are involved.

Certainly, the applications cooperation dissemination process will be very long and difficult, with regard both to the technological framework implementation and its organizational system and the relationships among Administrations.

Yet, ICAR project showed *"…with all due reservations about the activities that are to be accomplished and mainly concern the applications, the capability to pursue a cooperative attitude in developing e-government software. ICAR's success is not only the success of a technical project, but the success of the participants, who have created a real cooperation system"*.
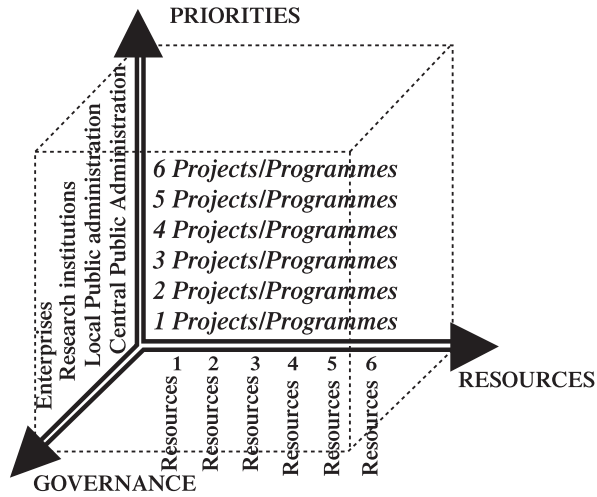
Therefore, we can realistically look forward to an action model characterized by system priorities that aim at assuring a "minimum level of innovation and simplification" (see Law no. 246/2005) in each public administration of the national territory, by means of:

- Defined projects and/or programmes, able to increase the value of the territory excellences, to find out innovation strategies and interventions.

- A triple helix cooperation governance involving enterprises, research institutions, excellence centres and citizens.

- Reserved financial resources.

293

List of the finalists of the iG2.0 Award

List of the finalists of the iG2.0 Award

The iG 2.0 Prize has been awarded by Mario Michelangeli, Regional Minister for Consumer Protection and Administrative Simplification of Lazio Region, during the three days of the Summit in a dedicate special session. The iG 2.0 Prize has been awarded to the best project selected in the field of the interoperability at a regional and European level on the basis of four criteria: innovativness, practical results, impact and transferability. The Prize has been awarded to EUCARIS, the European car and driving licence information system for the most outstanding initiative in the field of interoperability.

iG2.0 Award

IG2.0 AWARDS: Eucaris, the European car and driving licence information system

Country of origin: Pan European

Web address: www.eucaris.net

EUCARIS is a Dutch initiative and can be described as cooperation between several European central registration authorities. Formalized in a multilateral treaty, this cooperation is focused on the data-exchange regarding vehicle registration, driving licences, and later the accompanying personal data.

For this exchange, a system is used which was especially developed for this purpose: EUCARIS II. It is essential to note that EUCARIS makes no use of a central European database. Each country is responsible for its own registry of vehicle and driving licence information and its own registration procedures.

The EUCARIS application has recently been extended with services for the exchange of data concerning traffic fines and vehicle owner/holders, based on the legal framework of Public Administration and bilateral agreements between states. It is expected that in the near future all EU members will use EUCARIS.

The project is addressed to the Governmental authorities which are responsible for the registration of motor vehicles and the issue of vehicle documents and driving licenses.

The system can also be used by governmental organizations responsible for tracking stolen vehicles, theft and fraud prevention, as well as prosecuting authorities, the police and customs and excise.

Technology. Proprietary technology, Standards based technology, Not applicable/Not available.

EUCARIS is basically an application developed by the EUCARIS countries that enables them to exchange vehicle and driving license information in a secure way.

The application consists of two parts: - The multilingual web client application enables administrative personnel, police-officers   etc. to perform inquiries in other countries via their browser. - The so-called 'Core' application is responsible for the secure handling and communication of the messages. Requests from other countries lead to a search in the national registry, resulting in a response or a 'not-found' message.

On the other hand, requests from the own national users are sent all over Europe, and the incoming answers are collected and handed over to the web client. The main philosophy of EUCARIS is a direct 'peer-to-peer' communication, meaning that all countries communicate directly to one another, without any central component. Both synchronous (interactive) and asynchronous (batch) communication are supported.

Lesson 1 - Having a system that does not included a central register, but is based on a cooperation between national registration authorities that remain the holder of all data. This makes the project politically much more feasible.

Lesson 2- Fast implementation of new functionalities (like the integration of the Public Administration Treaty into EUCARIS). This is made possible by the EUCARIS organizational structure that allows to quickly react to changes. Lesson 3 - By sharing all costs of EUCARIS, the costs per member state remain low. This keeps EUCARIS financially attractive. Member states that only participate in, for example, the Public Administration information exchange only pays for that functionality.

A special Prize was awarded also to the best projects recognized on the basis of four following criteria: innovativeness, practical results, impact and transferability. The project that resulted the best in one of these four categories, received a specific award.

INNOVATIVNESS: Interopcyl

Country of origin: Spain
Web address: www.jcyl.es

The Castile and Leon Government in order to achieve its aims in administrative modernization, faces the creation of a regional interoperability framework. It also takes into account the enlargement of such framework with the aim of being part of a superior model of interoperability of national, European and international scope. This will allow it to achieve a full administrative interrelation and to fulfil the needs of citizens and companies alike.

This strategic initiative aims to endow the Region with a SOA Interoperability Platform to manage information exchange between administrations, and between administrations and the companies in need of their services.

Nevertheless, this platform can also supply national and European services, through the Spanish Administrative Intranet and the TESTA II network of the European Union.

Moreover, Castile and Leon has a land area of 93,898 Km2 and a population of 2.5 million inhabitants scattered in 2,247 municipalities, so it is the largest region in Spain and it has the largest number of municipalities.

These data help us to realize the difficulties to achieve an interoperability model which allows the exchange of information between the systems of 9 Provincial Councils and 2,247 Town Halls. This circumstance has induced us to use an interoperability model completely based on open standards, basically on Web Services, so anyone who wants to use any of the services offered can do it with all legal and security guarantees regardless the technology used.

The aim is to provide the region with the necessary infrastructure for the sharing of services and the exchange of information in a efficient, normalized and safe way between the bodies comprising the Castile and Leon Government (Ministries, Autonomous Bodies, etc), and the 2,247 Town Halls, the 9 Provincial Councils and, between these administrations and the companies of the region. We also try to be part of an interoperability framework of a superior level: national, European and international; by strictly using open standards. This let us to share and consume services at a superior scope, for the benefit of citizens.

299

Technology. Proprietary technology, Standards based technology, Mainly (or only) open standards.

The JCYL Interoperability Platform will be mainly based on the use of Web Services, and a SOA architecture is used to manage them at integration maturity level. Our model comprises a UDDI publishing service, a central point for Gateway security implementation and some additional components (LDAP, BD, @firma5.0, PKI, Reverse Proxies, load balancers, firewalls, etc.), all of them are redounded in an Active-Active backup centre.

The platform is based on a strict model of open standards to achieve a higher interoperability, and, in this sense, services are required to be in accordance with the WS-I (we recommend document/literal and document/literal-wrapped styles) and to implement WS-Security.

Other standards used are: JAX-RPC 1.1, JAX-WS, WSDL 1.1, SOAP 1.1, EJB 2.0 and 3.0, SAAJ 1.2, S/MIME, Base64, streaming attachment, WS-Annotation, WS-Reliability, WS-Policy, Username Token 1.0, SAML, XMLSignature and XMLEncryption.. We also consider a basic aim to achieve the EIF interoperability dimensions: semantic (using schemes), organisational (modifying our e-administration models and the interrelation between administrative bodies, as a complement to traditional paper-based administration) and technical (using our SOA and network infrastructure).

When developing an initiative such as the definition and implementation of an interoperability platform there is always something to learn. In our case, we have modified our initial plans as we were learning when facing every day problems.

To sum up, the lessons learnt we should highlight are: o It is basic for an interoperability project to use open standards as a means to achieve that platforms from different manufactures and programs developed in different languages can exchange information. In this sense, Web Services are a good choice, nevertheless, these have little differences included by the different manufacturers, so in order to guarantee the use of interoperability standards it is necessary to prove every development compatibility with interoperability profiles such as WS-I Basic Profile 1.1.

 The most critic aspect in an interoperability platform implementation is security. In this sense, it is very useful to normalize the security policies implementation to be in accordance with the legal system. This is not an easy task and, it would probably be the most painful for service consumers.

Thus, the time invested to define the right security policies for both suppliers and consumers will always be a good investment and will bring good results. Due to security and performance reasons, it is also basic to constrict the size of the messages and documents sent using the platform. o Promoting information schemes development will allow us to know, at any time, the meaning of the exchanged information, and so we will be able to process it accordingly.

These schemes ease exchanged   messages validation and will be reusable thus easing future developments.

TRANSFERABILITY: Semic, Semantic Interoperability

Center Europe

SEMANTIC INTEROPERABILITY CENTER EUROPE

Country of origin: Pan European
Web address: www.semic.eu

The Semantic Interoperability Centre Europe (SEMIC.EU) is a project by the European Commission which addresses the challenge of semantic interoperability. The main theme round this project is the platform which is used as a repository of interoperability assets.

Thus it facilitates the sharing of these assets at national, regional and local levels. The SEMIC.EU aims to become the new central reference for seamless data exchange of pan-European eGovernment projects. Its guiding principles are collaboration and sharing, not only of the assets themselves, but also of the experiences, documentation, methodologies, lessons learnt etc. Some public administrations have already implemented similar initiatives on a national level, and others are in the development or planning process, SEMIC, will complement these initiatives as it aims to implement the European Commission's semantic interoperability strategy.

Public Administrations at all levels have been provided with a collaborative platform to work together in the field of semantic interoperability. A lot of work has been done by different projects. Models, taxonomies, XML schemas and other assets were developed. The idea is to share such assets and re-use where possible, in order not to re-invent the wheel and move a step closer to achieving interoperability for pan European eGovernment services. By doing so, It aims to reduce administrative burden, make use of existing solutions and, consequently, to save resources on a large scale.

The service has a clear European design but engages in national and international activities as well. Beyond the exchange of general and specific interoperability solutions, the service encourages cooperation in domain-specific communities, face-to-face exchange and public discussions on relevant issues around interoperability.

SEMIC.EU fills a gap in participation since it gives stakeholders throughout Europe and beyond an infrastructure to communicate, it triggers discussions and lets practitioners have their say on semantic interoperability.

With its open character to support eGovernment, SEMIC.EU is targeted at public administrations. The ultimate beneficiaries, however, are the citizens of the European Union.

SEMIC.EU brings eGovernment professionals together for communication and collaboration across sectors and national boundaries, creating interoperable pan-European eGovernment services, making the life of the citizen much easier when moving from one state to the other as information can be easily shared. Therefore as the need for mobility arises, SEMIC.EU aims to facilitate the implementation of the principles of European integration: the free movement of persons, services, goods and capital.

Technology. SEMIC.EU and its repository are based on open standards and Open Source technology (OMAR). SEMIC.EU is committed to help the Open Source community by improving on already developed technologies. Another similar project is OSOR.EU, which shares open source software between public administrations. It is also funded by the European Commission. The components of SEMIC.EU's technology will be available via the OSOR.eu portal for reuse. In providing its own solutions for reuse SEMIC.EU sets a good example of its principle of sharing and collaboration. Open source solutions are chosen since pan-European eGovernment is dependent on applications that understand each other semantically. Any eGovernment stakeholder can gain access to the repository for search enquiries or to enrich the repository with a new or updated asset. As a service, SEMIC.EU assists developing standards for data exchange and coordinates the clearing process of such patterns to assure accessibility of wide scope.

Lessons learnt

- Sharing assets means earning interests three times:

    - An uploaded asset increases the visibility of the project that owns the asset.

    - The uploaded asset may be downloaded by others that help to improve the asset. Sharing assets also means perfecting assets for little or no money.

    - The most demanded assets indicate which policy fields are most en vogue at present - resulting in an effective promotion of these policy fields. Even more interests can be identified. Looking from the angle of citizens sharing assets leads to better eGovernment applications. For business it realises cost savings that would otherwise be spent for administrative tasks and public administrations profit as well: Their acceptability is growing.

- Experts on semantic interoperability find it very productive to collaborate across national borders, to overcome language barriers and eliminate sector boundaries. This was evident during the Launch Conference and is manifested by the great acceptance of the SEMIC.EU Service among eGovernment projects. The active participation of stakeholders illustrates the urgent need of a service being a tool for collaboration.

- SEMIC.EU is capable of assisting other eGovernment initiatives to push their services. In the context of eGovernment the sky is the limit. SEMIC.EU is the service that generates demanded modularized solutions for eGovernment projects by taking care of an asset repository. Mature assets can easily be applied to any eGovernment project and newly developed assets can be fitted in the evolutionary clearing process.

**IMPACT: Employment/unemployment status management:
actual interoperability through the CO eService**

Country of origin: Italy
Web address: www.lavoro.gov.it/co

The "Comunicazioni Obbligatorie - CO" (Italian for "Compulsory Communication") is an innovative Italian eService for the management of the employment/unemployment status of citizens in Italy. Until the deployment of the CO eService, most notifications required manual intervention at most stages and interoperability was purely recommended. Since it has been activated, the CO eService has processed over 380 thousand user registrations, 12 million CO-notifications: most of the data and information are safely web shared (interoperability) and paper-documents are no longer needed.

The CO eService actually improves the Public Administration's efficiency: every communication is real time processed and forwarded to both public and private entities that have to manage the employment status information, thus it achieves full interoperability and complete cooperation between national, regional e provincial administrations. It enhances the transparency, quality and efficiency of public administration and it simplifies administrative processes for labour market analysis and management. The CO provides special features for monitoring the Italian labour market. Enabled users can access to this special CO section and they can aggregate, cluster, etc. information and print statistic about e.g. the distribution of hiring according the economical sectors, the typology of the applied employment contract, etc.

The CO eService deals with information of more than 30 million people and it has been activated since 1st March 2008, it enables public subjects to discover and suppress the "undeclared/black work"for a better economical public governance, it provides innovative cross checking tax declarations and payment monitoring features. The Co eService represents the base for the Labour Service Network - the interoperability-based framework which Ministry of Labour is developing - and it is ready to anticipate targets exposed by the UE initiative "New skills for new jobs"(Council Resolutions of 15 November 2007 - 2007/C 290/01). CO is the notification that employers, either public or private, has to forward when recruiting, processing, shifting, dismissing any employment relationship. Every communication is real time processed and notified to the Italian Ministry of Labour, the Italian National Social and Welfare Services (INPS, INAIL, ENPALS, etc) and local offices of labour ("Centro Per Impiego" - CPI). Thus the CO eService achieves full cooperative governance towards actual both public/private entities interoperability.

The eService manages the employment status information from the first search to retirement and thus already provides features to improve the anticipation and matching of skills and labour market needs.

Technology. Standards based technology, Accessibility compliant (minimum WAI AA).

The CO eService is organized in different functional modules that shape the federal approach in Italy to job market monitoring. The CO is collected at provincial level where it receives its protocol number (id and registration time). The COs are then collected at regional level, then by means of the interoperability-regional-gate they are forwarded and univocally registered at national level, and the XML-Repository module that makes the information available for both further notifications to other national public services (interoperability and full governance) and statistical purpose (labour market analysis). A specific "CO Queue handler" parallelizes and optimizes the incoming communication stream.

The enabled end user can then directly interact with the national portal to monitor the CO and the employment status of a worker. The COs are sent to the upper and lower area level towards electronic-gates ("Porta di Dominio") that guarantee the confidentiality and security of communication through user identification, authentication, and authorization. Full interoperability and cooperation among different public administration has been achieved by the "eGovernment envelope" (Busta di eGovernment) standard from the CNIPA (National Centre for Informatics in Public Administration).

In less than a year the CO eService case has demonstrated that actual interoperability for good governance is possible in order to improve the services to citizen and save public money. Furthermore the service provides: 1. Interoperability and burocracy reduction is actually achievable. 2. e-Government services and in particular CO eService already meets the Lisbon Agenda 2020 raccommendation about "early warning system"3.

ICT can actually contribute to semplify the employment status data management, reduce the public cost for burocracy, provide effective tools for the labour market needs and offer matching. Every communication is registered once and its ID is shared by both public and private entities which have to manage the employment/unemployment status and related information (e.g. working insurance, retiring contributions, ecc.) and at different level of administrative organization and management. The centralization of a such data allows developing and exploiting innovative tools for labour market monitoring and the actual photography of citizens' background and job needs make the politicians able to plan effective education and training policies, and make the skills gap less wide.

The "cumpolsoriety" of the centralization of the information also provides innovative methods to monitor and uncover undeclared/black work and by means of the interoperability features it is possible to develop cross - administration checking (e.g. tax declaration and payement). The developed architecture is modular and thus the CO eService can easily integrate new services, in order to grow the Labour Service Network. The CO eService good practice can be applied to different labour context and connected to further European Countries in order to develop an innovative labour market intelligent cell, as indicated by the UE initiative "New skills for new jobs".

PRACTICAL RESULTS: Emilia Romagna Labour Information System

EMILIA-ROMAGNA LABOUR INFORMATION SYSTEM

Country of origin: Italy

Web address: www.emiliaromagnalavoro.it

The Emilia-Romagna Labour Information System (in Italian SILER), by the Regional Government of Emilia-Romagna, provides services supporting the whole regional network of Employment Service Centers; the Centers' main goal is to provide administration, governance and provision of information and services to citizens and businesses.

The SILER system even supplies online services for citizens and businesses which prefer the Internet to directly access without intermediaries. Information availability on a "loop" paradigm, provided by a strong interoperability with the legacy systems run by the different players involved in provisioning of employment services. SILER system is now regularly up and running and the policy makers of employment scenario have no alternative tools to be effectively supported in their tasks.

Technology. Standards based technology, Mainly (or only) open standards, Open Source software.

From the technological point of view, SILER system marks itself as for the following characteristics: - Web based; - Java based; - Interoperability: SOA based, Web Services (WS) standard particularly; - Relevant use of Open Source software components (growing during the system lifecycle).

SILER system development has been an unique opportunity to demonstrate that ICT could be considered not only as an enabler but as a real integration driver, always remembering to pay attention to an indispensable organizational effort. Without such a developed system, it is not possible even to start with the delivery of the very first service for citizens and business, that is the "right to access the information" on labour market and job demand. One of the major issues faced during the development of SILER, was the need to rightly locate each role, for the different players involved, in the entire organizational scheme of the process; and this, in a very unambiguous and shared way. These different players were used to manage their processes with their own custom tools and practices and each of them believed to own the "reference model".

The ESIIG2 Summit results: the creation of ERNI and the Interoperability Declaration of Rome

The ESIIG2 Summit results: the creation of ERNI and the Interoperability Declaration of Rome

European Regional Network for Interoperability

The Second European Summit on Interoperability in the iGovernment, held in Rome on October 20-22, 2008 produced some important documents addressed to the European Commission, the European Parliament, to the national authorities of the 27 European Member States and to all the European regional governments: these documents are the proposal of ERNI, the European Regional Network for Interoperability and the Interoperability Declaration of Rome.

The ERNI is a new network based on the **common interest**, expressed by the regions, the main ICT private sector agents, the academia and other intermediate actors, to promote and to improve the interoperability in the eGovernment in the European public administrations towards the 'iGovernment'.

The mission of ERNI is to provide a frame within which regions could to optimize the political decisions related to the interoperability in the eGovernment and within which that effort could be supported by the other actors who share the same interest.

ERNI also will be used as non **stop debate forum** about the pressing priorities in the filed of interoperability and the exchange of the best initiatives and frames of interoperability that allow to improve the ability of the regional actors to develop policies that take into account the real needs of the European citizens and the enterprises and the strengths and capacities of the regions.

One of the success keys of the activities of the ERNI is the achievement of a great **consensus** among the stakeholders involved regarding the **objectives** and the **priorities** of the network.

In this sense the network will be the ideal framework to promote joined activities, specially in the field of **European calls**, for the implementation of an interoperability that support the achievement of a more smart and proactive government, the iGovernment.

In short, ERNI is a tool to **inform European institutions and organisms about the regions and other stakeholders vision related** to the interoperability in order to influence European policies.

The ERNI will facilitate both the interaction among its members and the interregional co-operation, it will promote the collaboration with other organisms and networks at European and international level that support the achievement of the mission and the objectives of ERNI.

In order to reach its objectives ERNI will carry out some **activities** as:

• Adoption of agreements about common positions in order to influence in an effective way in the creation and implementation of the EU policies.

309

- Facilitating to the ERNI members their participation in the call for proposals launched by the European Commission.

- Promoting the creation of the European Agency for Interoperability.

- Encouraging the active participation in the II European Summit on Interoperability that will be organized by the Lazio region and will be held in Rome.

The ERNI will take advantage of the tools offered by the new initiative of the European Commission, '**Regions for Economic Change'**, that will support networks to implement the new Lisbon agenda in the framework of some themes that guide the economic modernization.

In this sense the ERNI fits perfectly with the thematic indicated by the European Commission for the modernization, namely:

- Accessibility (understood as eAccessibility).

- Quality and level of services.

- Innovation.

- Knowledge economy.

- New ICT.

- Regional development.

- Improving of the adaptability of workers (organizational aspect of the interoperability in the iGovernment).

- Increasing investment in human capital (organizational aspect).

This new initiative foresees a budget for co-financing regional networks through the European Regional Development Fund (ERDF) and to pick up brilliant ideas from the networks to use them within the new programmes.

The members of the ERNI will make efforts to obtain the support of the European institutions and organisms and to influence the creation and implementation of the European policies related to the eGovernment and, particularly, to the interoperability.

The Interoperability Declaration of Rome

INTEROPERABILITY DECLARATION OF ROME

October 22nd, 2008

The following document has been addressed to the European Commission, the European Parliament, to the national authorities of the 27 European Member States and to all the European regional governments

INTRODUCTION

We CONFIRM the validity of the introduction and principals stated in the Valencia Declaration of 2006;

We REAFFIRM our support to the construction of the European Union as a successful entity based on the common advance of all European Public Administrations of any territorial level, especially those close to the citizens; called to contribute to this construction on the principles of excellence, efficiency, transparency and participation of the citizens, as well as on the principles of collaboration and solidarity among their Administrations, giving priority to the investment in innovation and security;

We CONFIRM our commitment in achieving the objectives of the initiative i2010 of the European Commission, supporting the development of the Knowledge Society in the European Union, as well as of *eGovernment*;

We REASSERT that interoperability is the necessary and key enabler for the efficient, fair and sustainable development of *eGovernment*;

We CONFIRM the importance of the establishment of a non stop debate forum about the priorities in the field of interoperability and the exchange of the best initiatives and frameworks on interoperability that allow to improve the ability of the regional stakeholders to develop policies that take into account the real needs of the European citizens and enterprises and the strengths and capacities of the regions;

We WANT to contribute to the development of an efficient interoperability amongst our Administrations, CALLING and INVITING all citizens, Administrations, the ICT field, the enterprises, the organizations and Institutions of the Civil Society to collaborate in the achievement of the objectives hereby established.

Aware of all the above mentioned, reaffirming to recognize all the different specific government requests at a local, regional, national and European level, inviting all Institutions to participating in all the activities that will be developed after ESIIG 2 as well as to starting initiatives in the field of interoperability on the basis of the principle of subsidiarity.

WE ESTABLISH THE FOLLOWING PRIORITY OBJECTIVES

- We put forward to the European Union institutions the request for the constitution of a **European Interoperability Agency** as a tool for the promotion of interoperability amongst European administrations which:

  - Supports the balanced development of the knowledge Society in all the EU countries and the modernization of Public Administrations.

  - Supports the fostering of a culture of interoperability as an element of continuous innovation of services and products based on the ICT potential, that is a key element for the economic development of European regions.

  - Allows to share resources and knowledge with the aim of developing new innovation opportunities able to create competitive advantages, provide services that meet the real consumers' and Public Administrations' needs and facilitate the advance of an administrative, social and productive system adequate to the characteristics of economy and knowledge.

  - Fosters the interoperability culture and practices as the key elements for the creation of a strong synergy among the public and private sector and the Civil Society, for the construction of a digital inclusive society that tackles any risk related to the digital divide, favours the access to services through appropriate infrastructures and protects all citizens' rights in quality of digital consumers.

  - Contributes to make all regulations coherent in order to create a common legal framework.

- Promoting the creation of **ERNI** (**European Regional Network for Interoperability**) as a permanent governance structure among European regions, which involves the stakeholders that are directly closer to the subject and that, for this reason, are recognized as prestigious at a regional level, with the aim of creating a group of preferential interest that plays a role of qualified interlocutor towards the national and European authorities competent in the field. Specifically, ERNI, also in collaboration with other networks and in the associative forms that will be agreed, will operate for:

  - Favouring the consolidation, analysis and development of the European Interoperability Framework as well as of the concurrent synergies and methodologies between the EIF and the various local, regional and national interoperability frameworks aiming at allowing coherence amongst of the Public Administrations' regulations in force.

  - Promoting the introduction of Interoperability as a crucial requirement within the Programs or Action Plans regarding ICT of the regional and national public administrations.

  - Taking part in the financial opportunities proposed by the European Commission aimed at supporting priority initiatives for interoperability and in the identification of funds for the diffusion and reuse of the local and regional administrations' best practices.

  - Supporting the process for the promotion of the European Interoperability Agency.

Rome, October 22nd 2008

Follow the new and interesting developments of Esiig2

ESIIG2, the Second European Summit on Interoperability in the iGovernment, will have new and interesting developments.

The debate forum on ERNI (European Regional Network on Interoperability) is now active.

ERNI is one of the main priorities contained in the Declaration of Rome 2008 approved during the activities of the Second European Summit on Interoperability in the iGovernment - ESIIG2.

The Forum is a tool that enables the discussion, debate and interaction amongst European and regional stakeholders and intends to promote interoperability as a key element for a real modernization and a concrete improvement of the electronic public services.

Through the Forum you can send your comments, suggestions or indications starting from the Proposal for the creation of ERNI, available in the same web page.

Access to the Forum through the ESIIG2 website: http://www.esiig2.it and submit your registration.

The registration on the website will allow you to be always informed about the ESIIG2 news, the organization of the next event, ESIIG3 and the realization of some important initiatives that have been discussed during the Summit. Moreover, if you need more information, do not hesitate to contact us to the following address of the ESIIG2 Organizing Secretariat, esiig2@regione.lazio.it, and phone numbers +390651689965, +390651689988.