SEMIC.EU

Semantic Interoperability Centre Europe

# Interconnecting Europe

## Conference Book

This publication was prepared for the IDABC Programme.

European Commission, Directorate-General for Informatics (ed.)
**Interconnecting Europe**
Semantic Interoperability Centre Europe

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http://www.semic.eu
http://ec.europa.eu/idabc


*Printed in Belgium*

# Table of Contents

# Introduction

**SEMIC.EU is a horizontal measure of the IDABC programme and will be key for the achievement of Semantic Interoperability. A new tool to Interconnect Europe.**

A lot of work has been done by the national administrations and the European Commission. A lot of projects have been implemented. A lot of resources have been invested. The European Commission is committed to facilitating the re-use of these resources where possible. Experiences and project methodologies from Member States and the harmonisation of interoperability assets are the main pillars to achieve interoperability.

In terms of Semantic Interoperability, the EU is facing new challenges. Most EU Member States have already implemented national eGovernment programmes. With the ongoing integration at European level, we have to ensure that exchangeable data retain the same meaning whilst jumping over the hurdles of different linguistic, cultural and administrative environments. How can we be sure to exploit the diversity across EU Member States and in parallel attain Semantic Interoperability?

The Semantic Interoperability Centre Europe offers a state of the art collaborative tool for stakeholders and Member States. A tool, which will present new opportunities to all who

would like to use it as a platform, through which there will be the possibility to discuss interoperability assets, support mechanisms, and related news. This is also part of the role of the IDABC programme, to help the development of the right tools and to ensure interoperability at EU level.

The European Commission is facilitating the building of an expert community on the subject. It is through knowledge that the true potential of this project and similar ones comes to fruition. This is done by offering various opportunities for stakeholders to meet, discuss and share information between one another. The commitment from the National Administrations in this sector is undoubtedly vital. Interoperability can only be achieved by the willingness of stakeholders. It is encouraging to see Member States taking the spirit of interoperability at a policy level. It clearly shows that our efforts are not only highly appreciated but also taken on board by the Member States and this gives us strength and determination to do more.

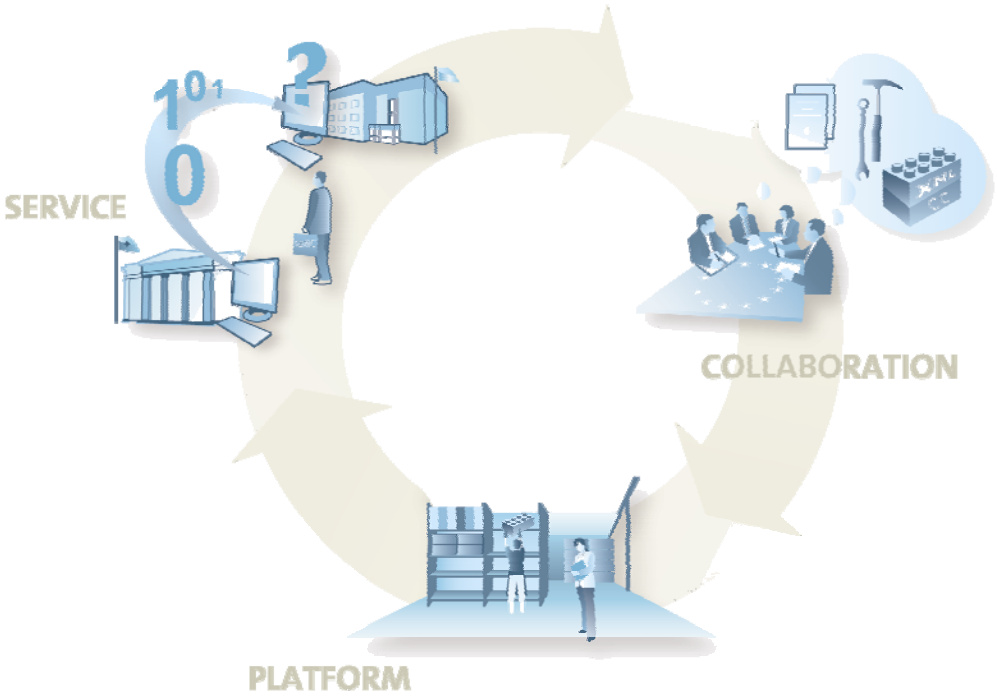
The launch of SEMIC.EU should mark the beginning of a new way to implement projects through the re-usability of resources. This will not only provide a guarantee for Semantic Interoperability but better support, fewer resources spent, making projects more feasible and ensuring security of investments.

This project has the full support of the European Commission and I am looking forward to seeing the potential of SEMIC.EU accomplished. I am convinced that as we reach this important milestone, it will bring us all closer to work together for a more Interoperable and Interconnected Europe.

**Francisco García Morán, DG Informatics, European Commission**

Director General

# 1. The Semantic Interoperability Centre Europe



# Vision of SEMIC.EU
# Interview with Aldo Laudi, IDABC Project Officer for SEMIC.EU

**Mr Laudi, you are Project Officer for SEMIC.EU. Can you give us an idea what "Semantic Interoperability" actually is?**

**Aldo Laudi:** Yes, I am the Project Officer for SEMIC.EU. I have been working for the European Commission since November 2007. I am a Seconded national Expert from the Maltese Administration where I was responsible for the management of the eGovernment Corporate Programmes.

To my understanding, Semantic Interoperability is the ability for two systems/ applications to agree on the same meaning of the data to be exchanged between them, in order to make the exchange possible and that information is able to be used by any of the systems.

A practical example of Semantic Interoperability will be when a person goes to a foreign country and tries to purchase medicine by trademark. The situation where that trademark is not known in that particular country is not uncommon. As a result, the name of the medicine will not be in the pharmacy's database. Therefore, if the person does not know the ingredients of that particular medicine, then it will be

close to impossible for the pharmacist to supply an equivalent drug.

When two systems or people will need to exchange information between each other, they need to agree on the attributes and agree on the meaning of those attributes to be able to use them. Semantic Interoperability can be achieved once the users are able to do this without recognising the difference in the exchanged data. In our case, pharmacies around the world would agree on a common database with unique identifiers, their trademarks and different ingredients. This does not mean through the use of technology on its own, we can solve Semantic Interoperability, but rather people need to agree on the meaning of their exchanged information, whilst the technology must be able to capture that meaning.

**Okay. But what exactly is the role of the Semantic Interoperability Centre Europe in this context?**

**Aldo Laudi:** Although the SEMIC.EU project can be seen as another EU Commission IT project, I think it is more of a package facilitating the sharing of experiences, syntactic assets like for example XML Schemas, semantic assets like ontologies, methodologies, and building networks so that stakeholders can come together for the development of interoperable pan-European services. It is a structure that permits stakeholders to coach and support each other in the development of interoperability assets. All this is technically possible through a platform. The whole project is built on three principles. Those of openness, transparency and communications. The platform is built around these principles in a way to facilitate communication, be open to everyone and user friendly with least barriers for use and transparent in its processes and decisions.

SEMIC.EU is key in achieving the first steps towards Semantic Interoperability, as it facilitates the process by which the actual meaning of content can be exchanged, understood and finally be re-used. I think this is a major challenge in Semantic Interoperability and it is what the Semantic Interoperability Centre Europe will address. On all levels.

### Why is it that these tasks can only be tackled in a pan-European way?

**Aldo Laudi:** The challenge today is to achieve full interoperability within Europe, from a semantic, technical and organisational point of view. The European Union consists of 27 different public administrations with 23 official languages so far, as there are acceding countries as well who will form part of the bloc in the near future. This is just the tip of the iceberg. As there are hundreds of Regional administrations and thousands local ones, which add to the complexity of achieving interoperability within Europe. So the problem is not only on an international scale only but also on a national level.

All this diversity makes interoperability even more difficult to achieve, however more challenging. There has to be a coordinating role. In this case the EU Commission through the IDABC work programme is fulfilling that role. Semantic Interoperability deals mostly with the agreement about the meaning of specific content in order to make the data exchangeable and useable. Although difficult to achieve, on a national scale, it is somehow manageable through policies by the central Government. But when it comes to a European dimension, the challenges tend to grow exponentially with an increasing number of countries. So, an important success factor is the ability to take a holistic perspective, and implementing it through a pan-European approach.

### Where do you see the greatest challenges for a repository like SEMIC.EU?

**Aldo Laudi:** The challenges for the success of the project are many. However the biggest challenge I see is getting project and asset owners to collaborate. In cases like this one, technology is just the driver, as there are very few things that it can't do. But when you look at SEMIC.EU as a tool, then the most important task is to convince stakeholders to use it. This is not always easy: They may have different views on projects like these, they may be sceptic, they may not want to go through the trouble, they may not see the true potential of the project, they may see this as extra work etc.

It is important to make stakeholders understand the benefits of such a process. The benefits of sharing one's experiences and assets. The benefits of re-using what has been developed by someone else. The benefits of coming together to collaborate, share and build systems together. I think this is the greatest challenge.

**Three years down the road: Could you describe how the world is turning a bit more smoothly with the help of SEMIC.EU? There is certainly a vision like this.**

**Aldo Laudi:** Well, this is a very interesting question. By the end of 2009, we would have invested just above 2 million Euros for the development of this project in order to explore the full potential of such a collaborative tool and be an initial step towards further cooperation between Member States with the possibility of becoming a permanent programme on the Commission's list. The 2 million Euros will be used not only to develop the platform, but also to develop the supporting functions around the platform, like the development and maintenance of the clearing function, stakeholder involvement and a number of studies including on the challenges of multilingualism.

As said before, this only depends on the Member States themselves and their willingness and commitment to participate. Having said this, I think there is a lot more potential for this project. There are a lot of initiatives, knowledge, resources and assets in the EU Commission and within the Member States that can be potentially shared. If properly implemented this project as is today could save a lot of resources to national administrations. However, seeing beyond this horizon is also possible. Most of the Member States are implementing or planning to implement their own repositories. They have interoperability needs, and these needs have to be addressed. So why not re-use the same assets from SEMIC.EU? Why not use SEMIC.EU as their own national repository, without substituting the already implemented repositories?

These could only be a few ideas that can be developed into a future vision for SEMIC.EU. However, let us for now be practical and a little bit more pragmatic, as it will all de-

pend on the results after the first year and a half of operations.

### In a nutshell, why is SEMIC.EU such an important project for eGovernment in Europe?

**Aldo Laudi:** With the world becoming more and more of a small village and thus people increasingly moving around and starting new lives and businesses in other countries, we need to make use of technology to support these people's endeavours. The ultimate beneficiary here is always the citizen, the end user, who will find it more meaningful to change his address from a foreign country, or for his doctor abroad to update his medical record at home. Whatever it is, the final aim is to use technology to make the life of the citizen better.

EGovernment so far has been seen from a national perspective. People's needs are changing. The needs during mobility, and its facilitation is expressed by those who experience it. It is the EU Commission's responsibility to address those needs. We can only do it by starting to look at eGovernment from a larger perspective, a more international one. Ours is the European dimension. Having more interoperable pan-European eGovernment services will by all means improve the life of many European citizens and fulfil the true potential of eGovernment. SEMIC.EU is only addressing a small but a very important part, the semantics of it all.

***Thank you for this insightful assessment.***

***Aldo Laudi, MT,*** *is the Programme Officer responsible for the Semantic Interoperability measures within the IDABC Unit, European Commission. Mainly, he is responsible for the management of the Semantic Interoperability Centre Europe, SEMIC.EU. Aldo comes from the Maltese National Administration where he used to occupy the role of the eGovernment Corporate Programmes Manager in the ICT in Government Unit.*

# Giving Meaning to eGovernment in Europe

## Klaus Reichling, SEMIC.EU Project Manager

The importance of eGovernment is not only a national but increasingly a European matter. Often perceived as a race between national administrations, the implementation and expansion of digital government services to citizens, business and administration have gained an international if not supranational dimension. It does not take much imagination to accept that building materials, addresses, goods, plants, food and anything which is subject to trade, exchange or registration have different lingual and systematic representations in different countries and systems. And this is precisely what eGovernment in Europe in general and Semantic Interoperability in detail is all about. A plethora of issues and items, one great challenge: getting meaningful information across and eliminating ambiguities.

### Capitalising on existing resources

The European Commission gave the push to create SEMIC.EU because it wanted to tackle the challenge of seamless data exchange between pan-European projects and to reduce the consumption of resources in making systems capable of

reliable, meaningful interaction. The successful interpretation of data at all ends of information channels is indispensable in administrative, political, and economic matters but also in citizen services. One just needs to think of the EU Service Directive or the registration of chemicals. Both require vast amounts of data to be supplied, exchanged, stored and interpreted. Without functioning mapping tables, taxonomies and harmonised translations by other means this will, plainly, never be possible.

What can SEMIC.EU deliver? Even though the technical platform www.semic.eu with its repository for "interoperability assets" forms the visible core of the project, the centre is more than a mere download tool or collaboration portal. Harmonisation and an incremental clearing process are its main ideas: Once established as the reference point for Semantic Interoperability resources, a self-sustaining process can emerge: data models, taxonomies, and ontologies will be refined, eventually leading to greater attractiveness to other users. An increase in demand and trust, respectively, will widen both scope and depth. It is a fascinating thought that projects in fields as diverse as the transport industry, IT service providers, farmers and public registries might eventually benefit from each other's efforts to make their daily business run smoothly. This is why SEMIC.EU aims at creating synergies across sectors and organisational boundaries. By making existing solutions available to others, the platform and repository reduce mapping and transformation efforts and, ultimately, costs.

## An open and community driven approach

As a European project, the active participation of national experts and professionals is absolutely crucial – both in official bodies (the SEMIC.EU Advisory Group) and as contributors and users of the portal. The threshold for participation shall be as low as possible: The deliberate acceptance of imperfectness is reflected by the clearing process which each contribution goes through. This, of course, requires trust in incre-

mental improvement through exchange of ideas and expertise.

Community building is an integral part of the project. The SEMIC.EU launch conference is just an initial step on the path to a fruitful process that does not only take place online but also face-to-face. Confusion might arise from the fact that there are already many initiatives out there, especially in EU Member States. SEMIC.EU supplements these efforts and tries to tie national achievements together for mutual benefit. At the same time, it addresses multilingualism as one of its focal points. Just think of an item as simple as addresses: What looks like a clear definition of municipality in Latvian might be a fuzzy concept in Portuguese.

## Harmonisation over standardisation

SEMIC.EU is first and foremost designed to achieve interoperability by harmonisation of existing solutions. Solutions are further developed by peer review and consensual enhancement. But why not standardise? One obvious reason is that the possibility of finding bilateral and multilateral solutions and adopting them in other contexts is a lot more promising both in terms of output and of the anticipated hands-on experience – real life solutions developed by people who are involved in the daily business. A collaborative approach also explicitly welcomes the exchange of imperfect or sketchy information. And lastly, it also means taking the ideal of unity in diversity seriously: Making exchange possible and at the same time respecting economic, legal and cultural differences.

As the implementers and managers of SEMIC.EU, we are excited to be part of this project and to contribute to the exciting venture of giving meaning to eGovernment in Europe.

***Klaus Reichling, DE,*** *holds a diploma in computer science and is acting as principal consulting for the ]init[ AG. Over the last ten years, he has successfully managed a variety of national and international eGovernment and eBusiness projects. With the award of the contract for the SEMIC.EU project to ]init[ and its partners, Klaus was assigned as the project manager.*

# 2. European Perspectives on Interoperability

# Experience for a pan-European Collaboration
## Sylvie Colas, FR

Administrations have to face a commonly recognised challenge:

- On one side, improving their relations with the citizens, by providing them with enhanced services and also by facilitating their understanding and their collaboration in various processes linked with the execution of the "regalian" authority;
- On the other side, but simultaneously, they are committed to control their expenses while increasing their overall performances.

Information and Communication Technologies can help a lot to achieve success. But these technologies are more and more defined through standardisation at a world wide level. For the French administration, as a member of the European Union, there is a strong requirement of consistency and interoperability at the regional level.

How to reconcile in practice these different contexts, when developing models and rules that the national community, firstly all types of administrations or authorities but also private actors, should follow in a spirit of "voluntary" adherence?

Examples are electronic exchanges of business data. This area is closely related to ebXML standardisation, for which the leading body is UN/CEFACT, but which is also addressed through CEN.

The approach followed by the French administration for providing support to project managers was to make available, within a standardised framework based on UN/CEFACT recommendations, a method for analysing business processes, defining message by assembly of semantic components (i.e. semantic building blocks that represent the general types of business data in use today) contained in a central library, generating the syntactical solution (e.g. XML Schema) and then updating the library.

This standardisation issue pushed the involvement of the French administration from 2005 in the new eGovernment groups for standardisation of the exchanges of business data at CEN (EEG13) and at UN/CEFACT (TBG19) levels. These groups offer the opportunity to pool with other countries national results for projects related to standards for the exchange of business and government data (eArchiving, ePublic procurement, etc).

At national level, the French administration established a workshop between ministries and governmental bodies to define semantic components for data exchanges within French administration (civil status, justice, agriculture, etc.) and between the administration and its partners. Most of these data exchanges are national and probably will never be the subject of any international standard. But in terms of interoperability, the workshop takes due attention to the compliance with UN/CEFACT specifications in particular the UN/CEFACT Core Component Library (CCL).

This workshop studies the CCL in relation with governmental data exchanges and builds a "French" library of semantic components. This library contains the components of the CCL (both in English and translated into French) and components used in France and not yet in the CCL.

This national collaborative process (similar to standardisation) with involvement of the ministries in this workshop improves the "adoption" of the French library (therefore the CCL) as the reference library for governmental data exchanges.

This experience in developing the components used for national data exchanges can serve the improvement or enrichment of the UN/CEFACT CCL. The workshop established in 2007 a first set of change requests with the specified business needs to the existing components in the latest version of CCL. These change requests were therefore submitted by TBG19 to the group responsible for the CCL harmonisation. At the end of the harmonisation process, most of the change requests were approved with or without amendment in order to be included in the next version of the CCL.

The above experience has proven to be efficient and is presented for a possible "copy", or better said, for inspiring common initiatives that could find a rather good place within SEMIC.EU. If such a need is identified a European collaboration could be established extending the French approach:

- Beginning by the most used parts of UN/CEFACT CCL in eGovernment, the national governments could identify in common, the differences between the CCL and their national libraries and put the problem encountered as a common issue;
- As regards the individual administration presenting its data, the comments received can help to improve the compatibility of their national developments with the UN/CEFACT CCL; this remaining their exclusive initiative;
- Submit, when necessary, European eGovernment change requests to the UN/CEFAT CCL through the TBG19 group.

***Sylvia Colas, FR,*** *works in the Ministry of the Budget, Public Accounts and Public Service in the General Directorate for State Modernisation in France. She is involved in the initiatives of the European Commission's IDABC programme, SEMIC.EU Advisory, CAMSS and EIF.*

# Semantic and Organisational Interoperability in Communicating and Collaborating Organisations

Terje Grimstad, NO

Full electronic interoperability between public and private sector and between public agencies is highly prioritised in Norway as in most other European countries. In Norway, two Norwegian Official Reports were published in 1988, introducing and discussing concepts about collaboration and communication in the public sector. Up until then, there had been a tremendous increase in IT-systems, which were not able to communicate or exchange information, all over the public sector.

Much has been accomplished during the last 20 years. The introduction of TCP/IP and the Web has built a foundation for both technical interoperability and services for citizens and businesses. However, many unsolved issues remain, especially semantic and organisational issues. In Norway, Semicolon is a contribution from the research community to shed light on these problems and suggest solutions to overcome obstacles for better interoperability.

## Assets

The interoperability situation in Norway is not bad. The Norwegian public sector is increasingly user-oriented and there is strong national and international policy

support for electronic collaboration. 'An Information Society for All', Report no. 17 (2006-2007) to the Norwegian parliament, addresses electronic collaboration as a means for the provision of electronic services on a 24/7 basis. EU's Lisbon strategy claims that a well-functioning public sector represents a competitive advantage for businesses. It is claimed that collaboration between public organisations, citizens and businesses is necessary to provide a more effective and efficient public sector.

In summer 2007, the Norwegian Ministry of Government Administration and Reform, which is responsible for coordination of the use of information technology and measures to make government more efficient and service-oriented, organised a working group with key ICT-personnel from all major public organisations to give recommendations about a Common ICT-Architecture for the public sector in Norway. The group delivered their report to the ministry in January 2008 [FAOS-report, not yet published]. All the Semicolon-partners from the public sector participated in this working group.

Quite a lot of infrastructure is already in place. Altinn (www.altinn.no/en ) is a service through which citizens and businesses can report information to public authorities. MyPage (www.norge.no/minside) is a portal through which services from different public bodies are made available to the citizens. SERES II is a project run by the Brønnøysund Register Centre and the goal is to provide a national metadata register.

## Problems

Even though there has been policy support for interoperability during the last two decades, and several services are in place, many unresolved issues still remain.

One of the conclusions from the FAOS-group was that the stove-piped managerial structure in the public sector is an obstacle for collaboration and communication. The public sector organisations are allocated a budget by their ministry. All of the goals and evaluation criteria are intra-organisational. No, or only very limited, funds are allocated for collaboration activities spanning several organisations belonging to different ministries.

The Office of the Auditor General in Norway has made a recent study of ICT as an instrument to obtain a better health service and better utilisation of resources in the Health sector in Norway [Document 3:7 (2007-2008), published 22nd April 2008]. The study concludes that still, after 10 years with heavy investments in ICT-support, a vast majority of information exchange is paper-based. The Directorate for Health and Social Affairs has had the responsibility to implement a national strategy plan for electronic collaboration in the health sector. However, it seems like the means available, and the means in this context should not be interpreted as money only, has been too limited. The Auditor General raises the question whether there is a discrepancy between the responsibility and the means available to reach the target.

A forthcoming report from the Auditor General raises the same questions for electronic interoperability in general between public agencies in Norway, stating that the overall situation is not satisfactory compared to expectations and plans.

Most of the services available today stem from one public body only. There are almost no cross-sector services, e.g. services to citizens in life-cycle situations where a child is born or a person dies. Such services require streamlined business processes running through several public organisations. There must be integration with existing data registers, and a common view of the information following the processes e.g. represented and supported by a national metadata register. Last, but not least, an easy to comprehend, universally designed, user interface to the services through well known public portals must be supported. Few of these assets are in place.

## Semicolon's contribution

Semicolon takes a holistic view on interoperability. All dimensions from the European Interoperability Framework are in principle covered. However, the project does not put much emphasis on technical interoperability. Semicolon is centred on the semantic and organisational dimensions and in-

cludes information models, business processes, metrics, methods and tools.

Semicolon will develop ICT-based methods, tools and metrics through research based experiences in real collaboration cases where the aim is to produce public electronic services to industries and citizens. The idea behind Semicolon is that the project shall involve influential organisations, build competence and understanding and also generate recommendations for methodologies, tools and metrics, i.e. give the public sector a set of guidelines to construct, launch and evaluate the effect of cross-sector services. Due to stove-piped budgeting and evaluation principles in the public sector, the Semicolon project will address collaboration and coordination issues that would not have been addressed by the individual organisations alone.

Five large public bodies provide collaboration cases as study items for the project. All cases are cross-sector in nature. In total, the cases cover a large spectrum of typical collaboration and communication issues. Our ambition and assumption is that Semicolon shall make a substantial contribution both to identify and give advice on strategies and solutions to overcome obstacles for interoperability in the Norwegian public sector.

The cases which have been selected are either on-going exercises or they have been started as a direct result of Semicolon. New cases will be developed during the project period. The initial cases are:

Realisation of eDialogues (Tax Directorate and Health Directorate)

The eDialogue-concept is introduced by the Tax Directorate. eDialogue services are cross-sector services such as the birth dialogue and the death dialogue. The eDialogue requires modelling of cross-sector processes and accompanying information. Metrics and indicators should be developed in order to measure the socio-economic effect of each eDialogue. The measures should be both quantitative and qualitative, and will among other things be used as a basis for decisions to implement an eDialogue service or not.

Metadata model (Tax Directorate)
This case will constitute an example for other public organisations and pave the way to the establishment of a national metadata register. It will provide specific requirements to the SERES II work at the Brønnøysund Register Centre.

The Birth-eDialogue (Directorate for Health and Social Affairs)
This eDialogue-process involves lots of public organisations. When a child is born the child should be allocated a unique identity number by the Tax Directorate, it must get a name, the local health station should be notified, and the parents should be notified about health control and vaccination. In some cases Child Welfare Response and Consultation Teams and the Norwegian Correctional Services need to be notified. Norwegian Institute of Public Health and Statistics Norway gather information for national health statistics. Today much of this process is manual and much can be gained by the formation of a streamlined electronic process, an eDialogue-process.

Provision of data for researchers (Statistics Norway)
Statistics Norway has defined the provision of information on persons, establishments and enterprises for research purposes as a case. Researchers at approved research units can order data at an individual level from Statistics Norway's data collections (www.ssb.no/english/mikrodata_en/). Such data may be ordered according to special conditions. Furthermore a data security agreement is required. Accurate semantic definitions and high quality information models are prerequisites for high quality data.

Result XML
The Norwegian Association of Local and Regional Authorities - KS has selected standardised integration between ICT systems in the Local Administration sector as its case. That way the Local Administrations will be able to make harmonised requirements specifications when purchasing ICT systems.

## Facts about Semicolon

Semicolon is a three year research project partly funded by the Norwegian Research Council. It addresses the challenges to es-

tablish compatible ontologies, information models and the necessary organisational coordination and collaboration to simplify public service production across several public bodies. The project runs 2008-2010, and has a budget of about 6.3 million Euro.

The Semicolon-project is organised in the following six work packages:

WP1 – Project and innovation management

WP2 – Organisational interoperability

WP3 – Semantic interoperability

WP4 – Information modelling, methodology

WP5 – Tools support

WP6 – Dissemination and conformity

The participants of Semicolon are: the Directorate of Taxes, the Brønnøysund Register Centre, the Directorate for Health and Social Affairs, Statistics Norway and The Norwegian Association of Local and Regional Authorities – KS. The organisations performing the research are Det Norske Veritas (DNV, the coordinator and project owner), the company Karde (initiator of the project), consultancy Ekor and the Norwegian Centre for Informatics in Health and Social Care - KITH. The University of Oslo and the Norwegian School of Management as well as the universities of Oxford and Aberdeen provide expertise in semantics, object orientation and organisational theory.

***Terje Grimstad, NO,*** *has been a research scientist and research director at the Norwegian Computing Center (1980-1994). He has served one year in the European Commission as a scientific officer (1995). He has been the director for systems development and electronic services in ErgoGroup (1996 -2003). He is now the general manager for Karde.*

# The Next Generation of eGovernment
## Ulrich Reinhardt, DE

The first children not having known the world before Google and Wikipedia will soon be leaving school. For this generation of users, the internet as a social medium is taken for granted. That said, the Web 2.0 phenomenon has changed online communication significantly. The participatory developments which the label describes have wiped away the paradigm of one-way communication. Now, the web conflates existing media formats in one interactive multimedia channel thereby removing formerly defined boundaries between communication tools.

Public administration is not exempt from this evolution. Already, citizens expect fast, transparent and easy access to information, active support and media appropriate services.

In a few years, however, when Web 1.0 and Web 2.0 will have turned into what some people call Web 3.0 or "the semantic Web", the use of Information Technology to interact with public administration will have turned into a regular routine. The internet-based communication of citizens with their government (C2G) will become the common way of interacting even if non-

electronic interaction will still remain as secondary communication channel.

## EGovernment readiness

The average maturity level of the European countries' "eGovernment Readiness" will continue to grow significantly. The borderless and cross-departmental sharing of information based on pan-European semantic data sets will become the standard of eGovernment.

The Economist Unit's latest e-readiness ranking shows that European countries are among the frontrunners of eGovernment development (Economist Intelligence Unit 2008). With Sweden, Denmark, the Netherlands, the United Kingdom, Switzerland, Austria, Norway and Germany nine European countries are ranked within the World's Top-15 in fitness for eGovernment. But comprehensive eGovernment can only come to life when systems are interoperable.

Advances which enable multi-level services are especially interesting. Those services can only cooperate if they are interoperable on all levels: They must interact institutionally and legally, their systems must be able to comprehend each other. That is, they need to construe each other's information correctly (semantically) and they need to have the right communication channels established (technically). This is what makes integrated services - known as *One Stop Government Services* - possible. Citizens can experience the quality of such integrated services once these public services become available on a comprehensive government portal as a single access point.

## Making systems understand each other

The problem of technical interoperability is commonly accepted as being solved. Technologies of application integration have reached a high level of sophistication. Thanks to commonly applied internet and security technologies and to platform-independent software and data formats, communication partners can acquire and exchange data at any time.

The challenge we are currently facing is one of content and meaning. Especially on an international level, a lot of work remains to be done. IDABC now takes a first and important step with SEMIC.EU. By this community-based approach we are expecting considerable leaps forward in the development of Semantic Interoperability both within the European Union and beyond.

The technology needed to turn this vision into reality is available and ready to use. With a project like SEMIC.EU, we are paving the way towards future web services. We are getting ready to meet the demands of the next generation of citizens – the first generation socialised offline and online.

***Ulrich Reinhardt, DE,*** *has been a Member of the Board of Directors of ]init[ since 1 January 2006 where he is responsible for Technical Solutions and Innovation. Ulrich Reinhardt has been at ]init[ since 2000. He heads the Mainz branch office and is Key Account Manager for specific applications and systems integration.*

# Dutch eGovernment: Past and Present Semantic Initiatives
Emile Van der Maas, NL

## An example of semantic interoperability

After World War II the Dutch government encountered problems with Semantic Interoperability during the first ICT automation wave and rise of the internet in the 1980's. On basis of the age-old political autonomy of government organisations, over 1600 registries existed, all based and built on domain specific laws, having all their own definitions, interpretations and meaning of what was in reality the same object, making exchange of data via Internet difficult if not impossible.

As an example there was the case for an average pig. On basis of domain specific laws and regulations from the ministry of Agriculture, Transport, Food, Public Health and in the domain of consumer goods, more than 40 definitions of 'pig' co-existed in systems and processes. With Internet and digital exchange of data, it became apparent that the old way of working within autonomous organisations and systems, encountered serious interoperability problems.

The need was felt to re-organise government to maximise the benefits of ICT

## Goals of Other Government

In order to deal with the negative side effects of the old way of working a program was initiated in the 1990's, called the Other Government. Main goals were to achieve a government that:

- Does not ask for information it already has.
- Is focused on better service towards citizens and businesses.
- Will not allow its facilities to be misused.
- Is well-informed.
- Is efficiently organised and 'in control' of its internal affairs.

To realise these goals, an ICT working-organisation was formed, called stichting ICTU. ICTU still is the central organisation responsible for designing, developing, realisation and implementation of ICT components or assets.
www.ictu.nl

Work began at ICTU in 2001 within the program 'streamlining base-data' on the restructuring of the 1600 + decentralised registrations. The idea was to create national centralised registrations, containing all possible data about persons, addresses, cars etc. As a start, definitions on generic data to uniquely identify persons, cars, buildings etc. was standardised and use of these data in base-registrations was made mandatory by law.

Though the need for streamlining of data and definitions was not questioned, there was little support however for the idea of a strongly centralised and rigorous standardisation. The rigorous approach hardly fitted the decentralised centuries-old way of working at the Dutch government. Moreover maintenance was considered a major issue as was the cost of implementing.

Nonetheless at the end of 2003 a stable semantic core was laid down with the appointment by law of the first 6 base-registrations. A further 9 followed soon. Its content eventually consisted of the generic data to uniquely identify and authenticate objects throughout all government processes.

It was recognised however that in this way with just base-registries, Semantic Interoperability could not be realised. The connection still had to be made with the context of use and semantic meaning in everyday processes. It also was clear that for automated systems standardisation of definitions is a great thing, but you cannot force civil servants or citizens to adjust in everyday speech and use of information to this one formal definition. It is a more realistic approach to recognise that there always will be variation in meaning, depending on the context of use.

So how to realise coherence between semantics within a more decentralised approach?

## The need for coherent architecture: NORA

Thus work was started at the end of 2004 on an information architecture- as part of an ICT architecture for the Dutch government as a whole. This Dutch Government Reference Architecture or NORA ( www.e-overheid/NORA), was based on the European Interoperability Framework (E.I.F.) 1.0 and adopted its main principles. The challenge behind NORA being to achieve interoperability, better chain management, function clarification, the by law mandatory re-use of data, and the strive for more uniform definitions and better harmonized laws.

The aim was and still is to work toward a service-oriented architecture, in which major components like base registries delivering single-point access to nationwide basic services for all government organisations. This certainly also stresses the need to find a solution for Semantic Interoperability: how to exchange data based on domain specific law-defined definitions and values and still being able to know how to interpret

these data, whilst re-using them in other domains?

## Outlines for a federated (semantic) architecture

The E.I.F. principle of subsidiarity outlined the organisational model of the data- and information architecture for Dutch eGovernment. Thus also providing a better alignment with the traditional decentralised way of working. Within this federated information architecture the connection can be made with domain-specific meanings and values in working processes and life-events. The authentic data in base-registrations fulfilling their linking-pin role in this to uniquely identify and authenticate objects in all of these processes and events.

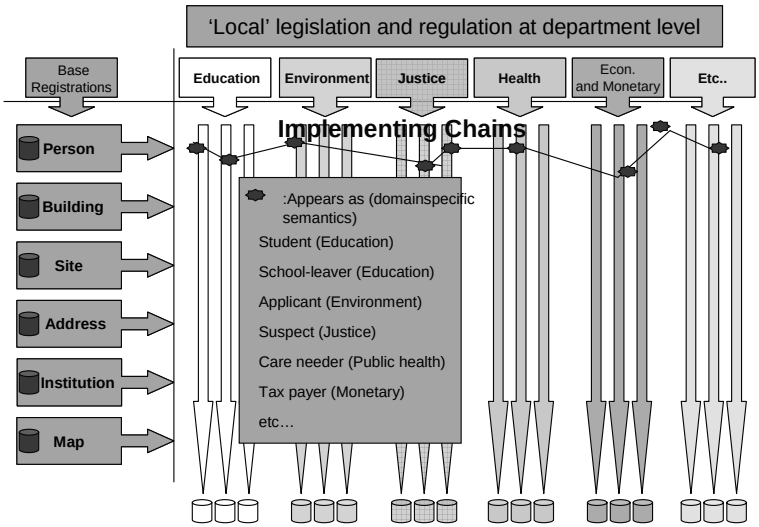
From the political goals from the 0ther Government programme, it was stressed that the main focus shouldn't however be on the internal organisation of government and the formal, technical semantics, but on giving the citizen and society better access to government information and products. Web-metadata, clear description of products and, for example a good search engine and and personalised information page, also have to support life-event driven semantics.

## The role and function of metadata

As a solution for Semantic Interoperability on all levels between databases and documents, processes and life events, the Dutch government is now looking into the possibilities of metadata to achieve this. In NORA 2.0 an international standard for metadata was proposed. This ISO 23081 standard focuses on a standardised way to make a metadata schema and within that how to uniquely identify contexts (domains) and domain-specific meanings and values. Perhaps as a parallel with the role of the authentic data in base-registries, standardisation of metadata schema for contexts, will make it possible to uniquely identify a domain and domain-specific meanings and values.

The agreement on this kind of metadata schema for unique context identification, thus opening the way to focus on the mapping rules between contexts.

Thus in a federated semantic architecture, domain specific semantic meanings and values can co-exist, on the condition that:




- the whole of government agrees on which domains there are to uniquely identifiable and how we're going to identify them. Organisations need to decide to witch domain their processes relates and thus to witch semantic models. The discussion on what domains there can or should be identified, recently received a new impulse with the proposal from SEMIC.EU for a generic Member State activity schema. Within the Netherlands we look to this schema as both a mapping table as a base-model for the development of domain specific semantic assets and models, like taxonomies.

- Each domain-specific semantic model, as written out in a data dictionary, UML schema or worked out taxonomy, has to connect on a national level, to at least one base registration. The base registrations thus fulfilling the role of national, cross-domain semantic assets providing the generic message core components that are mandatory to be inherited in domain-specific semantic models. Thus Semantic Interoperability within the national context can be achieved.
- The whole of Dutch government agrees on a proposed set of metadata that have to be (automatically) recorded in order to enable unique context-identification. The identifiers for context containing, amongst others, metadata about the business-context: what organisation is or was responsible for the registration or mutation of data. What is the legal framework, as part of the business-context, since domain specific laws define meanings and values at a more detailed level.

At this moment, a first try-out of the possibilities of metadata in achieving Semantic Interoperability, is worked out at the level of the national ministries. In a baseline information-policy for all of the 12 ministries, metadata are the core to uniquely identify context specific semantic meaning and values. The outline for this concept base-line is expected to become available at the end of June 2008. If reactions are positive and agreement is achieved on the implementation path and time-scheme, the proposal will be rolled- out to be implemented for all of governmental organisations, both centralised as decentralised.

Other work on Semantic Interoperability and assets is being done on a national data dictionary that will provide in time the generic XML core components and access to the related domain-specific data dictionaries and taxonomies. It is estimated that this central catalogue will be operational in 2009. At this moment a national services registry, containing, amongst others, the generic data services from the base registra-

tions, nears completion. Also a first domain-specific taxonomy is available for the annual fiscal year reporting (xBRL). Work also has started on a web-ontology aiming at giving citizens better insight in the organisation and working of Dutch government.

This article gave but a short insight on past and current initiatives on Semantic Interoperability at the Dutch eGovernment. If you would like to know more on Dutch eGovernment initiatives and projects on Semantic Interoperability and assets under construction, you can contact us at:

Knowledge center eGovernment via www.e-overheid.nl on www.e-overheid.nl more detailed information can be found about Dutch eGovernment programmes and projects, NORA and the base registrations. You can also post an e-mail with your question at Emile.Maas@ictu.nl or at info@e-overheid.nl.

***Emile van der Maas, NL,*** *studied History at the University of Leiden, Netherlands, specialising in Methodology and philosophy of science. In 2004 he started as an ICT architect at ICTU for the programme streamlining of base-data. He was one of the founding architects at ICTU for the NORA, the Dutch Government Reference Architecture. Currently he is an architect at ICTU at the Dutch eGovernment Knowledge Center and works on semantics, Semantic Interoperability, base-registrations, metadata and develops NORA further.*

# A Market User Perspective Is Important
Arild Haraldsen, NO

## Semantic interoperability

The European Interoperability Framework (EIF) of the EU describes three layers of interoperability: technical, semantic, and organisational. The Internet and World Wide Web, along with technologies like SOA and Web Services, are providing protocols and standards necessary in order to link different systems at a technical level. This helps open up the information silos that have traditionally existed between computer systems in different departments and enterprises. However, technical interoperability also lays bare the challenges that exist at the semantic level, since it does not address the issue responsible for most of the costs involved in information integration projects – that is, a common understanding of the precise meaning of the information.

## Introduction to the selected technologies

This report focuses on technologies that purport to offer Semantic Interoperability. Many of them are either directly based on XML, or else utilise XML in one way or another. Because it is actually a meta-language, XML has given rise to a whole flora of markup languages de-

signed to allow the representation and interchange of information and knowledge in various domains. As noted above, all of these involve semantics to some degree or another, but only a few of them exhibit sufficient generality to be termed semantic technologies.

## RDF/OWL

RDF (Resource Description Framework) and OWL (Web Ontology Language) are two of the technologies that form the foundation of the Semantic Web.

The Semantic Web is an extension of the existing Web in which information is given well-defined meaning, enabling computers and people to work in better cooperation. The term "Semantic Web" was first coined by Tim Berners-Lee, the creator of the Web, in his article in Scientific American in May 2001 where he presented his vision for the next generation Web. His vision was to annotate the data on the web so that they can be clearer understood by machines, not only by humans as the situation is today. In that way it is possible to have Web requests answer your questions in a much more intelligent way than just refer to documents that contain your search strings.

The vision of the Semantic Web is to extend principles of the Web from documents to data. This extension will make it possible to fulfil more of the Web's potential, in that it will allow data to be shared effectively by wider communities, and to be processed automatically by tools as well as manually.

The Semantic Web allows two things.

1. It allows data to be surfaced in the form of real data, so that a program doesn't have to strip the formatting and pictures and ads off a Web page and guess where the data on it is.

2. It allows people to write (or generate) files which explain – to a machine – the relationship between different sets of data. For example, one is able to make a "semantic link" between a database with a "zip-code" column

and a form with a "zip" field that they actually mean the same – they are the same abstract concept (described in an ontology). This allows machines to follow links and hence automatically integrate data from many different sources.

Semantic Web technologies can be used in a variety of application areas; for example: in data integration, whereby data in various locations and various formats can be integrated in one, seamless application; in resource discovery and classification to provide better, domain specific search engine capabilities; in cataloguing for describing the content and content relationships available at a particular Web site, page, or digital library; by intelligent software agents to facilitate knowledge sharing and exchange; in content rating; in describing collections of pages that represent a single logical "document"; for describing intellectual property rights of Web pages (see, for example, the Creative Commons), and in many others.

### Topic Maps (ISO/IEC 13250)

Topic Maps is a standard technology for describing knowledge structures and using them to improve the traceability of information. It is based on a formal model that subsumes those of traditional finding aids, such as indexes, glossaries, and thesauri, and extends them to cater for the additional complexities of digital information. The model is defined in an ISO standard (ISO 13250), along with interchange syntaxes, a formal semantics, and a graphical notation. Ancillary standards define a query language (TQML), a constraint language (TMCL), and mappings to other knowledge organisation specifications, such as Dublin Core.

The value proposition of Topic Maps is that it provides the ability to control infoglut and share knowledge by connecting any kind of information from any kind of source based on what it means, i.e. its semantics. It is increasingly used in Enterprise Information Integration, Knowledge Management, and e-Learning, and as the foundation

for web-based information delivery solutions.

### UN/CEFACT Core Components

The Core Component Technical Specification (CCTS) is a cornerstone of the UN/CEFACT standardisation e-business activities envisioning simple, transparent and effective processes for global commerce. Its focus is on machine-to-machine exchange of business documents like order, billing, transport documents between business-critical applications hosted by collaborating business partners. Core Components are the syntax-neutral and technology-independent building blocks that can be used for data modelling. Major benefits of CCTS include improved reuse of existing data artefacts and improved enterprise interoperability.

### ISO 15926

The purpose of this standard is to facilitate integration of data to support the life-cycle activities and processes of process plants. To do this ISO 15926 specifies a data model that defines the meaning of the life-cycle information in a single context supporting all the views that process engineers, equipment engineers, operators, maintenance engineers and other specialists may have of the plant. The data model is generic and can be used in any industry. Industry adaption can be done by defining the appropriate semantics by extending the Reference Data Library. See below.

Traditionally, data associated with a process plant have been concentrated on some individual view of the plant at a point in time. Such data are usually defined and maintained independently of other groups of users, resulting in duplicated and conflicting data that cannot be shared either within an enterprise or with business partners of an enterprise. ISO 15926 enables integration of such data, and as it is based on 4D (handling the space and time dimensions) paradigm it can handle change over time.

## UML

In the field of software engineering, the Unified Modeling Language (UML) is a standardised specification language for object modeling. UML is a general-purpose modeling language that includes a graphical notation used to create an abstract model of a system, referred to as a UML model. UML helps you specify, visualise, and document models of software systems, including their structure and design, in a way that meets all of these requirements.

UML is officially defined at the Object Management Group (OMG) by the UML metamodel, a Meta-Object Facility metamodel (MOF). Like other MOF-based specifications, the UML metamodel and UML models may be serialised in XMI. UML was designed to specify, visualise, construct, and document software-intensive systems.

UML is not restricted to modeling software. UML is also used for business process modeling, systems engineering modeling, and representing organisational structures. UML has been a catalyst for the evolution of model-driven technologies, which include Model Driven Development (MDD), Model Driven Engineering (MDE), and Model Driven Architecture (MDA). By establishing an industry consensus on a graphic notation to represent common concepts like classes, components, generalisation, aggregation, and behaviours, UML has allowed software developers to concentrate more on design and architecture.

UML models may be automatically transformed to other representations (e.g. Java) by means of transformation languages.

With regard to semantics and Semantic Interoperability these issues have not been the core issues that UML was designed to handle. The focus of UML has been primarily on the development of software systems, not to secure interoperability between these systems on a semantic level. However, UML delivers modeling notation that is very useful for information modeling and with the use of profiles UML is often used as a vehicle to secure Semantic Interoperability.

## Conclusion

This work has been the participants' first step in the direction of improved and common understanding across technologies. And it has been useful to identify the strengths and weaknesses of the technologies and become conscious of how one in some cases can opt to use different technologies together to give the maximum effect when using semantic technology in some projects.

In an emerging field like semantic technology the process of writing this report has brought together companies and researchers with the goal to share and increase knowledge. We hope to receive comments on this work and we know it is not complete as such.

## Contributions from:

- Arne-Jørgen Berre, SINTEF
- Stian Danenbarger, Bouvet
- Lars Marius Garshol, Ontopia
- Johan Wilhelm Klûwer, Det Norske Veritas
- Magne Valen-Sendstad, Det Norske Veritas
- Per Myrseth, Det Norske Veritas
- David Norheim, Computas
- Steve Pepper, Ontopedia
- Mariann Sundvor, NorStella
- Øyvind Aassve, NorStella

***Arild Haraldsen, NO,*** *is general manager of NorStella, a private non-profit foundation for e-business and trade facilitation. Arild Haraldsen is Head of Delegation to UN/CEFACT Management Forum. His organisation is actively participating in UN/CEFACT and CEN/ISSS working groups. Haraldsen is head of NordiPro – a co-operation between the "pro"-organisations in the Nordic countries. Haraldsen has also written several textbooks on strategy and e-business strategy.*

# Semantic Interoperability in Hungarian eGovernment Development

Szabolcs Szigeti, HU

Recent Hungarian eGovernment development projects were mostly done in an isolated fashion. Various applications were developed without having them in a comprehensive framework. While most of these applications are gathered under a central portal ("ügyfélkapu") further development may be hampered without a common eGovernment framework. To solve this problem, a project for creating a national framework was initiated by the Prime Minister's Office. The project is lead by the Centre of Information Technology of Budapest University of Technology and Economics and is planned to finish at the end of 2008.

The framework project consists of several sub-projects:

- Process description methods and tools provide a suitable methodology and tools to generate formal description of the various government processes. The aim of the project is to bridge the gap between the administrative viewpoint and the information technology viewpoint in creating high quality process descriptions.

- Application development framework
  Define the architecture for eGovernment applications and application development.
- Interoperability requirement framework
  Create a framework for technical and Semantic Interoperability. Provide methodological and technology help for projects. Collect an initial set of interoperability standards and recommendations.
- IT security requirement framework
  Provide a security framework for the development projects. Give methodology and sample documentation help for IT security related activities in eGovernment development.
- Repository for standards and other documentations
  Provide an authentic portal for all interoperability related standards, recommendations, schemas, etc. Set up the technology team for keeping these documents up-to-date.
- Auditing for IOP and IT security
  Create the necessary framework for auditing the development projects for IT security and interoperability conformance.
- Project management framework – Adapt project management methodologies for managing eGovernment specific development projects.
- Pilot implementation project
  Applying the result s from the other sub-projects to real-life development projects.

The role of Semantic Interoperability is very much evident in the framework project.

The chosen architecture for the eGovernment applications is the Service Oriented Architecture (SOA). Since the essence of SOA is the service, interfaces are defined between the service providers and the users of these services. This means that it is essential to agree upon a common set of national technical and Semantic Interoperability requirements that fulfil the needs and conform to similar EU requirements.

Fortunately defining the technical level of interoperability is relatively straightforward (but still requires a large amount of work) since the various Internet related protocols serve this purpose well.

Defining the Semantic Interoperability level is a more complex task. The framework project takes several steps to achieve this goal.

- The formalised method for describing eGovernment processes means, that the services used by the processes need to be (and will be) catalogued. Based on this catalogue and on the process descriptions interactions can be determined and the necessary Semantic Interoperability formats and schemas may be defined. The way to achieve this is to start with some of the large processes, which cover a large amount of Semantic Interoperability requirement. Further developments will align with the rules laid down during this period.
- The repository will provide a common, authentic and compulsory source of interoperability requirements. It is especially important, that any such interoperability format, schema, which are defined during the course of development project and approved for use in the whole eGovernment system, will be made public for new development projects. The technical committee behind the repository will be responsible to periodically review and update the standards and requirements.
- It is essential that all interoperability requirements are to be enforced. No application may be deployed without appropriate audit. Interoperability (and also IT security) evaluation laboratories will audit the results of the development projects. Only after a successful audit may the application be allowed to connect the already existing eGovernment system.
- The development methodology and project management methodology

will make sure that interoperability (and also IT security) requirements are appropriately dealt with in any development project.

To summarise the state of Semantic Interoperability in Hungarian eGovernment development projects, the following can be said:

It is clear that no eGovernment system can be successful without applying and enforcing the principles of interoperability. This is clearly stated in the currently running project for the development of the eGovernment framework. Several steps are taken to appropriately place Semantic Interoperability into the development project. A long term solution is under consideration for creating and maintaining such supporting institutions as repositories for IOP schemas. A framework for interoperability audit is also under development.

Projects are planned to enhance the results of the framework project. Some of the important projects are the development of a common administrative ontology, the continuation and enhancement of the standards repository and the creation of evaluation and audit laboratories.

***Szabolcs Szigeti, HU,*** *has a Masters degree in electrical engineering and an MBA degree. His main professional fields are computer networks, IT security and eGovernment. Currently he is working at the Centre of Information Technology of Budapest University of Technology and Economics. He is responsible for the IT security and the interoperability sub-projects in the currently running eGovernment framework project.*

# The Semantic Web and Official Publishing
## Jeni Tennison & John Sheridan, UK

Governments have a lot of information which people want to access – either to find and use or, more importantly, to re-use. Increasingly, the most useful services are those that combine data from different sources, mixing public, private and user created content.

In 2007 the UK Government commissioned Steinberg & Mayo to conduct the independent Power of Information Review, to advise how best to respond to current trends on the web, such as social networking and data mashing – also known as Web 2.0. A key point was recognition that a government website is not always the most effective place to provide information. Better that the information is where the users are, which means its reuse by others on the web. For example, food hygiene inspection reports have greater impact on restaurant review websites than when they're hidden on the local Council website.

There are a number of options for enabling this kind of re-use using the web as platform to deliver data, including APIs that provide structured data using XML, JSON or YAML. With new Semantic Web standards such as RDFa, it is now possible to markup textual information inside web pages, in effect turning a

traditional website into an API. The UK government has been exploring the use of semantic markup inside XHTML documents in order to facilitate access, use and re-use of data.

Apart from the data held in databases, much of the interesting information that people want to re-use is semi-structured. With this type of information there is commonality of data but also considerable variance. For example, a job advertisement will almost certainly include the job title but not necessarily the name of a contact person. The creation and dissemination of such semi-structured information is widespread throughout the public sector. Examples include the description of job vacancies, government consultations and official notices such as those published in The London Gazette.

"Published by Authority" since 1665, the London Gazette is the UK Government's Official Journal and Newspaper of Record. It was set up to provide King Charles II with authoritative news while he and his court were in Oxford avoiding the Great Plague, and it has been in operation ever since. A new issue is published every working day. Each edition contains in the region of 300-500 official notices, covering insolvency, planning, transport and environmental information. It is a uniquely authoritative source of information about what is happening in the country.

To unlock the potential of this rich data we are applying semantic markup to the content where it is already published. Both the government and the web are inherently distributed so are natural partners.

Our aim is to release the information so that third parties can be creative in developing or extending new services to their audiences. The principle of serendipitous re-use means that the very best uses of government information will be all the things we cannot think of but that others will develop. To realise this vision, the challenge is to add semantics to the information in the London Gazette in a way that facilitates its potential reuse, allowing others to go on and construct useful web applications using Gazettes data.

We chose to do that using RDFa because:

- lowly screen-scraping applications benefit from a well-specified and extensible method for embedding semantics
- more advanced Semantic Web applications benefit from the full power of RDF triples
- browser extensions such as Operator and Piggy Bank are able to expose the data to users who are simply browsing the website
- it provides a close link between semantic information and the provenance of that information
- it should be relatively easy to integrate into an existing website

Our experience is that adding RDFa to an existing website is not as straightforward as might be hoped. The particular difficulties that we face are:

- The current Gazette website does not follow best practice for URL design (there is no single URL that identifies a particular notice, for example), so we have had to create a new URL scheme to provide identifiers that could be used in RDF triples. This scheme then has to be integrated into the existing website.
- As with many modern websites, the web page for a given notice is a patchwork of HTML authored directly by humans, created by ASP code, and generated from XML using XSLT. We had to ensure that the result was valid XHTML (with embedded RDFa). This requires not only changes to the code, but to the support given to the users who hand-author content for the site.
- The notices themselves are represented using two markup languages: a legacy presentation-oriented markup language for older notices and a semantic-oriented markup language used for more recent notices. However, the latter was mostly designed around a subset of notices that are fairly regular and well structured, whereas the ones that we want to mark up are extremely irregular and loosely structured. This leads to the

following problems, which necessitate changing the markup language we are using:

- While the markup language allows things like addresses and people's names to be marked up inline, the content of these structures is fairly strict and doesn't reflect the structures used in natural language notices; for example, multiple streets may be listed before a town appears in a sentence.
- Individual phrases such as a date and an address can be marked up inline, but there's no support for linking them together (for example to indicate that there is a meeting on that date at that address).
- Even with support for using the markup language in the authoring stages, those creating the notices simply do not bother marking up the important structures, and even where they are marked up, the content doesn't come from a fixed vocabulary. We explored several methods of encouraging users to make use of inline markup, but eventually decided that post-hoc automated markup of the notices was the most reliable method.

Our immediate next steps are to improve the semantic markup of the notices addressed in this project and extend the approach to more notice types. On the basis of what we've done so far, we believe RDFa provides a good approach for serving data from the London Gazette to the Semantic Web.

The long-term strategy for the London Gazette is to make it a highly re-usable information asset via the web -- part of the nation's core information infrastructure. The London Gazette provides an ideal way to publish semantically enabled official information for reuse, because of its reliability and status. Semantically enabling the Gazette lays the foundation for the development of a new official publishing strategy by the government; anytime legislation says that information must be published in the London Gazette, it will be in effect ensuring that information is made publicly available, in a consistent way and in a reusable form.

Future work will increasingly shift the London Gazette from a paper-based official publication into an online commodity that we hope will form the basis of many and varied applications as part of the web of linked data.

This project also takes forward the UK Government's general thinking about practical approaches for enabling the reuse of public sector information. By showing how it can be done, we aim to inspire others to follow us down this road.

***Jeni Tennison, UK,*** *is an independent consultant currently contracted to The Stationery Office who are working for the Office of Public Sector Information. She trained as a knowledge engineer, gaining a PhD in collaborative ontology development. She is currently working on the XProc pipeline definition language as an invited expert on the W3C's XML Processing Working Group, on the Layered Markup and aNnotation Language (LMNL), and on the DataType Library Language (DTLL).*

***John Sheridan, UK,*** *is Head of eServices at the Office of Public Sector Information in the UK, part of The National Archives. John works at the intersection of information technology, information policy, the web and online service delivery. He has both a strategic and an operational role within government. John helped establish and leads the UK Government Semantic Technology Community of Practice.*

# Interoperability in Piemonte
## Riccardo Grosso, IT

CSI-Piemonte is a regional public agency with the legal status of a Consortium, organised along private lines, owned by several public stakeholders of the Piemonte area, acting in the field of information technology and telecommunication.

CSI-Piemonte, as ICT body of the Local Public Administration, manages a great deal of data, both alphanumeric and geographic, which altogether represent a wide set of detailed description of the regional data patrimony.

According to the document European Interoperability Framework (EIF), interoperability consists in the ability from part of systems ICT and supported processes to exchange data and to share information and knowledge. In particular EIF identifies three fundamental levels of interoperability to consider: organisational interoperability, Semantic Interoperability and technical interoperability. In this perspective the so-called Semantic Interoperability has a fundamental role. The definition of Semantic Interoperability to the inside of the document is following:

"Semantic Interoperability is concerned with ensuring that the precise meaning of exchanged information is under-

standable by any other application that was not initially developed for this purpose. Semantic interoperability enables systems to combine received information with other information resources and to process it in a meaningful manner."

According to the perspective of the Semantic Interoperability, it's not to characterise reusable data formats, but to comprise, to make exploitation, to connect between the various shadings of meaning that these assume in practical administrative procedures, to the aim to render the effective composition and unification of various services possible. The technology key in order to face this problem is today the one of the so-called ontologies, data structures that describe the meaning of the terms used by a computer science application or an organisation so that the computers (but also the men) can reason on the relations between such terms, characterising similarity and differences of meaning.

Data and service requests are currently generated and managed in a distributed fashion. Furthermore, different actors (e.g., service providers, product sellers, governmental organisations) 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.

The following described experiences propose a conceptual box containing:

- in the lower parts, metadata and data of portal objects
- in the upper parts, conceptual data models ("light" ontologies)

Semantics criteria extract knowledge from lower parts, light ontologies validate knowledge.

Upper intelligence increments lower intelligence, and vice versa.

This generalised method allows knowledge reuse, experimented with Central Public Administration vs. Local Public Administration.

Any kinds of light ontologies, in coherence with lower level, can infer and reuse knowledge, for example also for other European Public Administrations.

## History of CSI Piemonte in metadata cataloguing, knowledge inference and ontologies.

The metadata catalogue of the Piedmont Public Administration was born in 1999, with the name of Infodir (Information Directory), and like evolution of previous metadata experiences of cataloguing.

Such catalogue contains and classifies initially the business metadata of the decisional systems of the Piemonte Region.

Until 2007, technical metadata of the databases are logical/physical like ddl (data definition languages) and glossary description, produced or reversed with tools.

In early 2007 a new version of Information Directory was released that exceeds some architectural limits of the old system.

The new Infodir has the following main characteristics:

- the backend data stewardship near the competence centres of materias in CSI and near the agencies
- separated and shared metadata views, business and technical
- generalised objects
- multidimensional model or facet-based (facets and focus)
- dynamic classifications, that is taxonomies, generalised, and combinable to criteria of text mining that allow to classify objects automatically.

For the continuation of the knowledge inference experience, conduced with University of Milan Bicocca and described in paper, we have reflected on generalising it.

In other words, it is possible to sophisticate criteria as an example (using the text mining or other methods) in order to make that

- increasing the conceptual knowledge base
- making criteria on whichever portal object

to obtain an increment of the semantics of the system?

## Ontologies Analysis within public administration

Currently Information Directory and SITAD are the metadata catalogues available for those who need to find the way through the huge amount of data (alphanumeric and geographic); these catalogues, available on RUPAR, allow data searching either through the identification of the main topic or using keywords in the description of the name of the metadata.

Several analyses have been carried out from this rich layer of metadata:

- Knowledge inference through methods and tools which map the PA conceptual schemes with logic schemes of the data bases
- Use of ontologies, that is enriched conceptual schemes, which define the objects of the topic, the qualities and the inferences rules which allow "deductive" reasoning.

## The history of CSI's experience in metadata cataloguing

The Piedmonts PAL's metadata catalogue born in 1999 with the name of Infodir (information directory) was the evolution of previous experiences in metadata classification.

This catalogue started containing and classifying business metadata about Piedmont Region's decisional systems.

In 2002 the catalogue began to grow and to develop along 3 main dimensions:

- public authorities and their registered metadata (not only Piedmont Region, but also City of Turin, at first, and then District of Turin and all the other local authorities);

- types of services and registered data bases, not only decisional systems, but also operational ones;
- metadata granularity, that is the introduction of data bases' technical metadata (tables and attributes) and application services (architectural components).

The main object of the metadata catalogue is the collection, to be read as the metadata cluster associated to it, that is composed of:

- data bases:
  - tables
  - attributes
- application
  - component

Every object is equipped with a standard Dublin Core metadata set, where you may find the objects' descriptions that are the base for both free searches and guided searches based on textual research criteria per similarity.

The main object, that is the collection, may be classified:

- by owning Public Administration
- by Topic
- by Cross section thematism

Classifications allow browsing, free researches allow searching.

Browsing and searching are fully independent and not combinable with each other.

Searching modalities can be either top-down (from the collection to the data-base's attributes) or bottom-up (from the single data base's column to the collections and the classifications that contain it).

Data Bases Technical metadata are photographs of the logical schemas of the data bases themselves.

The catalogue can be navigated by:

- Institution (Organisation)
- Statistics (ISTAT classification)
- Cross-section thematism

- Newness (backward from the most recent)
- Free research
- Word based research (headword vocabulary)
- Advanced research (using SQL criteria of equality or likeness)

Tables and columns have been catalogued with a bottom up approach, using reverse engineering techniques.

Since logical likeness mechanisms were not sufficient by themselves to make the metadata manageable, it became necessary to build the conceptual level of the catalogue and to see the information representation just as users do, regardless of the physical data process.

Supertypes (entities) were built:

- with regard to the business field
- borrowed from available generalisations for central Public Administration

Hence, 261 supertypes were built, mainly concerning:

- the "business" thematism (36)
- the "subject" hierarchy (42)
- the "good" hierarchy (30)
- the "document" hierarchy (9)
- the "location" hierarchy (12)
- the "location" hierarchy enriched by CSI territorial department's contribution.

Such supertypes have been connected to 25.515 columns.

A new version of Information Directory was released in the beginning of 2007, which overcomes some architectural limits of the previous Infodir of 1999.

The new Infodir counts the following among its main characteristics:

- data stewardship in the subject competence centres of CSI and other bodies
- separated and shared views of metadata, both technical and of business
- generalised objects

- dimensional or facet based model
- dynamic classifications, or taxonomies, generalised and associable with text mining criteria that allow to classify the objects as they are in the repository.
- intersectable research criterions

This is the URL to reference Infodir for Piemonte Region Public administration:

http://www.sistemapiemonte.it/mrspin/searchidir?type=search&term_query=&xsl=areesp3&isoptimized=on&qu_ruoliPubblici_idr=4&public=true&qu_type=obj

There are also specific links for other 2 LPA, Municipality of Turin

http://www.sistemapiemonte.it/mrspin/searchidir?type=search&term_query=&xsl=areesp3&isoptimized=on&qu_ruoliPubblici_idr=5&public=true&qu_type=obj

and Province of Turin:

http://www.sistemapiemonte.it/mrspin/searchidir?type=search&term_query=&xsl=areesp3&isoptimized=on&qu_ruoliPubblici_idr=6&public=true&qu_type=obj

Finally, its' possible to access by "CSI Piemonte view" to all LPA that have metadata catalogued on infodir:

http://www.sistemapiemonte.it/mrspin/searchidir?type=search&term_query=&xsl=areesp3&isoptimized=on&qu_ruoliPubblici_idr=8&public=true&qu_type=obj

### The LPA (Logical Public Administration) repository of conceptual data schemas.

In 2004, in order to increase the value of the registered metadata, a method and a tool have been experimented alongside Infodir, which would have allowed the fulfilment of the following main goals:

- building an embryo of dynamic taxonomy, with "like" criteria, in order to classify the metadata for similarity with the names of the taxonomies' elements
- allowing a reciprocal exchange of inference between the used taxonomies, which are actually made with the conceptual patterns of the

central Public Administration, and the constraints that are inside the structures of the registered logical data bases

In order to do this some taxonomies have been implemented, meant as entities' hierarchies and referred to the principal entities of the central PA:

- subject:
  - natural person
    - worker
    - self-employed
    - subordinate employed
    - public
    - contractor
  - juridical person (companies)
- item:
  - good
  - document
- geography:
  - place
  - territory
  - city planning

Each level of the single taxonomies has been associated with a rule of similarity, extracted from the descriptive technical metadata of the data bases' components (tables, fields).

Then also the relations between the taxonomies/hierarchies have been used, for example:

- "citizen pays tax" ("citizen" is an element of the hierarchy "natural person", "tax" is an element of the hierarchy "good")
- in order to deduce, with a top-down strategy, relations between the registered objects.

Mutually, the logical-physical objects registered in the data bases, having some reciprocal constraints between themselves, can offer bottom-up inferences, and therefore relations, between the elements of the taxonomies/hierarchies.

This taxonomic-ontologic inference's technique, used on Infodir, allows to verify in which data bases each single concept of the PA is physically represented and how it is correlated, or may be correlated, both top-down and bottom-up.

In 2004, in order to improve the registered metadata patrimonium, we have experimented several methodological and design ways that permitted the development of a database Repositories creation tool.

First of all a repository of database of Central Public Administration (CPA, developed some years ago) has been studied, in order to build a specific one for the Local Administration, exploiting the similarities between the two structures.

We analysed the existing methodology to develop the tool in a first version and then we implemented it following some heuristics. The achievement of such product allows the automation of an intellectual manual work, reducing the computational time.

We can define a repository as a collection of conceptual schemas, collected by the primitives of integration and abstraction that produce in output a pyramid of schemas of the company knowledge. The conceptual schemas use a representative standard founded on the Entity Relationship model that allows to show the existing relations among the objects of the system, representing the universe using classes of objects supplied with relationships and attributes.

In a period in which more and more quantity of data are manipulated by companies, a correct and functional organisation of organisational systems is fundamental for their efficiency; for this reason, a repository is the ideal tool to have a wide vision on the resources and to analyse the relationships between them all.

The growing of technological level in the last years introduced many governments, even the Italian one, to take care of the informatisation of administrations in order to increase the quality

of services for the citizens and for the businesses.

Ten years ago the first action took place for the building of the Public Administration repository; the aim was the analysis of departments' databases of Central Public Administration to create a conceptual pyramid that included various specific knowledge. A high level of resources was needed to complete the CPA repository.

Nowadays, to consent to build an apparatus that allows the collaboration between the Central and Local Administration, we tried to create a repository of LPA reusing the resources of the previous experience in the CPA activity.

In the new methodology we used some heuristics to strongly reduce the computational time and decrease the number of resources used in the job.

A first simplification is the reuse of the concepts present in the CPA conceptual pyramid to exploit the same knowledge for the reconceptualisation of logical schemas of LPA, saving a lot of time compared with the work of ten years ago.

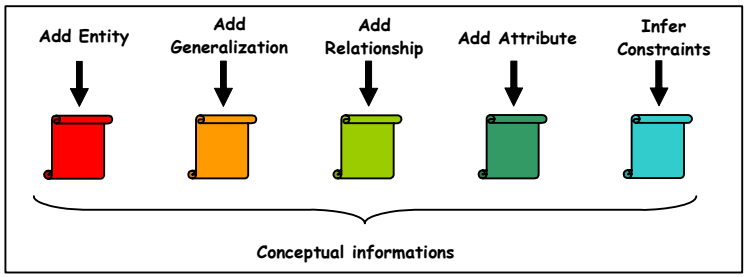
As in the case of CPA, the methodology is composed of 2 main phases:

Reconceptualisation of logical schemas of databases. The knowledge supplied from the manager of Piedmont Local Public Administration is in the form of logical schemas and it cannot be used to represent concepts; ia reverse engineering operation following a specific methodology is necessary.

Integration/Abstraction. Operation of union and simplification of conceptual schemas to represent knowledge to a lower detail level.

The reconceptual phase follows a methodology composed of five elementary steps that produce pieces of knowledge that enrich incrementally the entire conceptual schemas.

We created a series of basic functions that implement the steps in the methodology, and some superfunctions that drive them in a correct sequence.




To realise in the shortest time possible a stable and complete version of the tool we decided to use some heuristics compared with the original methodology on LPA data. These simplifications concern the algorithms of each function. In this way we did not modify the structure of the methodology but only some aspects of them that could be easily modified in the future rewriting the elementary functions.

A first choice that diverges from the LPA methodology is the non-creation of a unique conceptual schema growing step by step.

This choice was made to avoid a complex building of a model that represents a conceptual schema with entity, relationships and constraints, to facilitate the first developmental phases.

We preferred to create simple textual output, specific for every function that contains the information collected by its execution. The whole of these outputs, produced in the reconceptualisation phase, create a set of independent information that can be singularly analysed.

The limitations we introduced have restricted the quality of the final product compared with the original LPA methodology, but we can declare that our choice guarantees a first rapid development of a stable tool.

However the presence of an expert human being is essential to verify the final quality of the results produced by the tool because the use of automations and heuristics can generate sporadic errors.

The creation of abstract schemas differs from the original LPA methodology because it was too complex to implement it in a short range of time, and this diverges from the aim of the activity.

The abstract schemas are created in gradual manner and they start from the lower part of the pyramid to reach the top following a structural hierarchy used as guide.

For this job the taxonomies that generalise concepts of LPA linked to databases are helpful; these taxonomies have the advantage to represent a specific LPA repository and they can be used as a guide to integrate and to abstract conceptual schemas.

The working contract with the realiser of tools was based on a collaboration form that facilitated a remote worker; this was caused by the distance of the author from the headquarters in Turin.

In the weekly meeting we analysed the author's work, and planned the future activity; these sessions produced a series of important jobs, in which the practical and theoretical knowledge of an expert person and of an apprentice were joined to produce new solutions.

As a consequence of the remote working, we have decided to optimise the implementation following the evolutive developmental methodology to facilitate the job by time and places.

In the first meeting, we discussed the choice of Editor/Compiler tool and of the DBMS; we decided to use Microsoft Visual Basic 6 and Microsoft Access because of the simplicity and good knowledge of these applications.

Then, we collected the knowledge of LPA. Almost the whole data were exported from the central system (InfoDir) to the database managed by DBMS Access to be easily manipulated with query SQL to supply specific request.

In the developmental phase we produced the five steps for the reconceptualisation of a logical schema of a LPA database and the unique step for integration-abstraction.

At the end of this phase of development of the elementary functions, we could

design and implement the superfunctions that drive the basic functions in a correct logical sequence.

The tool is subdivided in three macro areas, corresponding to the user functions:

- Reconceptualisation of a database
- Integration-abstraction of schemas
- Creation of a repository

As it is easy to understand, the areas grow linearly by complexity and recall concepts of the previous areas.

As far as the interest shown in the project was very high, some upgrading operations were planned with the aim to increase the quality of the final product.

We can divide the improvements in two directions: the correctness of the contents of a conceptual schema and a better representation.

To conclude, the activity has satisfied the requests, it has supplied an efficient tool with a good degree of efficacy in regards of the contest, and it has settled important bases for future researches.

## Final consideration

In order to describe possible extends and reuse of our experience in other European Projects and Assets in SEMIC, we consider these aspects:

- our metadata and schema repository, like a blackbox, consists of:
  - "light ontologies" in upper part of blackbox (conceptual schemas with glossaries) valid on CPA
  - semantic search criteria on lower part (portal objects with descriptive metadata, not only database tables and field) valid on LPA
  - "light ontologies" in middle part, obtained with methodology and tool described, like a "marriage" from CPA concepts and LPA concepts inferred

So that other Italian regions (other Italian LPA) can reuse methodologies and tools for analogue "marriage" with Ital-

ian CPA concepts, also other European CPA with corresponding LPA can reuse the solution.

It is sufficient to "change the input" to the blackbox:

- other CPA light ontologies
- other LPA portal objects to infer

Methods and tools described can be reused theorically for any domain, for example:

- marketing light ontologies in black-box upper part
- objects of marketing portal

***Riccardo Grosso, IT,*** *has been a data administrator for the CSI Piemonte, since 2001. He specialised in IVECO – conceptual data modelling. For Piedmont Public Administration he took care of the metadata repository. Additionally Batini and Grosso implemented a method for obtaining repository of conceptual schemas by likeness and inference.*

# Estonian Semantic Interoperability Initiative
Martin Luts, EE

EGovernment services are built upon the exchange of information. Semantic or content interoperability is about ensuring that the meaning of the information exchanged is not lost in the process, that it is readable and understood by the involved people, applications, and institutions. In order to deliver cross-border services, the European institutions and Member States will have to agree on a multitude of semantic specifications, such as descriptions of people, products, processes, forms, etc. They will also have to agree on how to formulate these descriptions and where to store them for public use.

Many Member States of the European Union (MS) currently have some Semantic Interoperability initiatives ongoing, see for example Germany's initiative Deutschland Online , Italian' initiative in public administration , Finnish semantic initiative FinnONTO, and Semantic Latvia project. The scope and accent of these initiatives are quite different – some MS focus on consolidating semantic assets in several governmental institutions already in place into semantic portals, some on building full-scale national semantic web infrastructures, others target syntactic or semantic descriptions of data schemas, some are on

the level of human-oriented descriptions of assets, others try to reach automatic use.

There are also pan-European initiatives, which include:

- SEMIC.EU (SEMantic Interoperability Centre Europe), led by the European Commission's IDABC programme . SEMIC.EU is designed as a brokerage platform for third party semantic assets – like classification lists, ontologies, etc. It is not meant for creating/maintaining nor standardising the format of semantic assets.
- semanticGov, fully titled "Providing Integrated Public Services to Citizens at the National and pan-European level with the use of Emerging Semantic Web Technologies". SemanticGov is an EU-funded (FP6) research and development project that aims at building the infrastructure (software, models, services, etc) necessary for enabling the offering of semantic web services by public administration.

This paper outlines the Estonian Semantic Interoperability initiative in the public sector, describes its architecture and components used in architecture, present state and future developments. The organisational, time, budget and project management views are not addressed in this paper.

Semantic Interoperability Architecture for State Information System and Registries in Estonia

Interoperability Platform for State Information System in Estonia

The state information systems' data transport layer X-Road (X-tee in Estonian) is a technical and organisational environment that enables secure data transfer between digital government databases and enables secure data transfer between individuals and government institutions. It also coordinates the access of individuals to information being processed in government databases.

X-Road platform supports the technical interoperability of the components and registries of state information system.

Currently, X-Road does not support Semantic Interoperability. In the following we describe the extension of X-Road – the semantic layer to be built on top of X-Road infrastructure.

Overview of Semantic Interoperability Architecture for State Information System

Semantic Interoperability requires a system for the semantic description of several types of objects (infoware or information resources), like:

- operations (e.g. web services): the input-output data, preconditions, effects, logical relation between input and output structures;
- business processes;
- data-structures in databases or data-structures to be exchanged;
- official and other documents, webpages;
- other types of objects, in public or private sector.

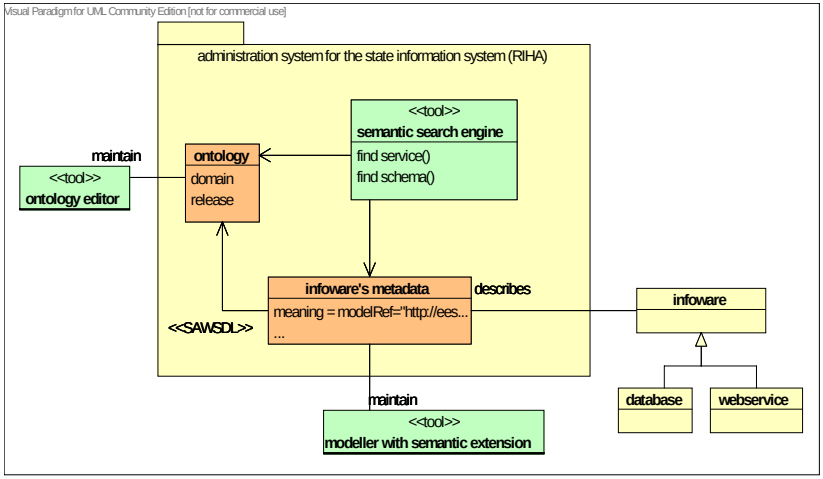



Figure 1. Semantic interoperability architecture for state information system and registries in Estonia

The Semantic Interoperability architecture for state information system and registries of Estonia (see Figure 1) consists of the following interrelated components: ontologies, semantically annotated objects (contained in infoware's metadata), supported by policies and guidelines, several processes and workflows, tools, educational activities, PR, among others.

The Administration System for the State Information System (RIHA) is the central tool in the Semantic Interoperability architecture for state information system. RIHA fulfils the following tasks in the Semantic Interoperability architecture:

- Hosting and publishing of ontologies.
- Hosting and publishing of infoware's metadata, including semantics.
- Serving as semantic search engine for semantic assets (resources).

In the following sections the most important components of the Semantic Interoperability architecture are considered in detail.

## Ontologies

### Ontology Support for SemI0

One of the main components of the Semantic Interoperability architecture – as designed for Estonian state registries – are ontologies. We use the term 'ontology' meaning "a formal explicit specification of a shared conceptualization for a domain of interest" (Gruber 1993: 199-220).

The ontology component in our architectural framework is not a monolithic structure – for the purposes of easier, domain-expert driven maintenance, it is divided into domains, e.g. "Environment", "Social Affairs". The initial tree for categorising ontologies is based on the official naming of EU activities. The language used in the semantic description of ontology objects draws from W3C recommendation OWL (Web Ontology Language). The ontologies are developed and maintained in a distributed manner, the tools to be used are not pre-

scribed as long as certain standards are followed (for example, Collaborative Protégé, Semantic Media Wiki, and others may be in use), but stored and published centrally – in the administration system for the state information system.

Ontologies that support the Semantic Interoperability architecture are classified into 3 layers depending on how general they are i.e. how general concepts they cover (see Figure 2).

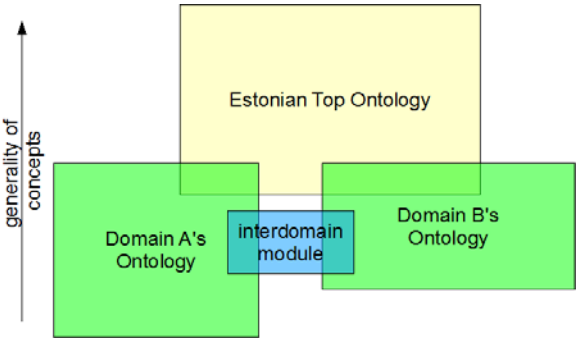



Figure 2. Modularity and layering of ontologies component in interoperability architecture

The reason for such a segregation of ontologies is that we foresee many different use-case scenarios of ontologies that go beyond the needs and borders of the state information system. For example, top ontology can be used by many applications, including commercial.

## Ontology Creation and Maintenance

From the methodological point of view, development of ontologies is a complex task and a lot of ontology building experiences are needed in order to participate in the production of good ontologies. In this respect, Estonia is at the initial level of education and experience, both in the universities as well as in software companies. However, the current Semantic Interoperability initiative is going to improve the situation.

The ontology creation process is planned to be data-driven, following a mixture of bottom-up and middle-out approaches – we start with data-object used as input-output in web-services offered by main state registries (i.e. population registry, land cadastre, vehicle registry). As a preliminary study shows, some 200 concepts will cover about 50% of the uses of data-object used as input-output in web-services. We are trying to partially automate this

ontology-learning task, including extracting concept relations from the so-called query-type web-services.

We plan to use release-based publishing of ontologies, i.e. every single or minor change does not reflect on officially published ontologies. The number of the year and release number are encoded into URLs which are used to point to the elements of ontologies, so the versioning of ontologies is achieved.

## Semantically Enriching State Registries

### Semantic Description of Operations Performed by Databases

We see our first priority to semantically annotate operations performed by state registries – as it promises quick return of investment and we also consider it to solve the complex task of integrating state registries – and creating e-services more efficiently – to some extent.

Semantic annotation of operations includes the description of every single operation and its input-output data-structures, preconditions, effects, relation between input-output, in a form of reference to the respective entry in the domain ontology. The languages used for description are WSDL and SA-WSDL (Semantic Annotations for WSDL and XML Schema). For example, describing the "cadastral unit" input data element of a web service, instead of describing it in human-readable form in the WSDL document, a SA-WSDL pointer, which refers to the appropriate record in land survey ontology is used.

Excerpt from semantically annotated WSDL follows:

```
<wsdl:types>

<xs:simpleType name="immovable"
sawsdl:modelReference=

"http://www.ee/onto/land/2008/release2/
cadastralUnit">

</xs:simpleType>
</wsdl:types>
```

## Semantic Description of Databases and Data Structures

Semantic annotation of databases and data structure includes the description of every single data element as a reference to the respective entry in the domain ontology. The languages used for description are XML for data structures, XMI for all types of database (relational, object-oriented or other) schemas combined with SA-WSDL (Semantic Annotations for WSDL and XML Schema). For XMI we have created a special UML profile for attaching SA-WSDL pointers into serialised UML (i.e. XMI).

## Semantic Description of Other Assets

The architecture outlined above is not closed for annotating only web-services or data structures. Adding semantics to business processes, documents, web pages and other objects, also beyond public sector, can be carried out with moderate effort. The reuse of ontologies, knowledge, tools is in the vision of the developers of this architecture.

## Guidelines

Department of State Information Systems, Ministry of Economic Affairs and Communications of Estonia, has released "Instructions for the Semantic Description of Databases and Operations Performed by Databases" (Ministry of Economic Affairs and Communications of Estonia 2007a) and "Methodology for the Semantic Interoperability of Databases and Operations Performed by Databases" (Ministry of Economic Affairs and Communications of Estonia 2007b) (available in English at http://www.riso.ee/en/information-policy/interoperability). Whereas the European Semantic Interoperability Strategy is quite general, the "Instructions for the Semantic Description" provide specific rules for application owners, developers and auditors.

***Martin Luts, EE,*** *received a MSc in IT Governance from Tallinn University in 2004 and is currently a Ph.D. student at Tallinn University of Technology. Since 2005 Martin has actively lead the Estonian public sector's semantic initiative and works for the IDABC programme as a member of the SEMIC.EU Advisory Group.*

SEMIC.EU

# Efficient: a Methodology and Toolset for Designing and Validating Electronic Transactions

Sophie Ramel, LU

In the eBusiness sector, the UN/Edifact Electronic Data Interchange (EDI) was a standard promoted from the 80's on, defining common syntaxes of electronic messages. However, there were a number of problems, mainly ambiguities in messages, messages used for multiple purposes, and the lack of a transaction view. The use of XML and of ebXML (Electronic Business using eXtensible Markup Language , a standard framework from UN/CEFACT and OASIS) addresses most of these problems. In addition, the UN/CEFACT's Modeling Methodology (UMM ) proposes UML as a modeling language, in a 3-layers approach separating the business requirements from the logical design and the physical implementation. However, designing B2B transactions with these standards still has some limitations, like information that cannot be modelled in UML, the lack of semantics, or the comprehension of models by business experts; we started the Efficient project to address these needs while building on the proposed methodology.

Efficient is a methodology and a toolset to help design transactions (initially – but not limited to – e-business transac-

tions) between partners using UML, and to help business users without IT knowledge to validate them collaboratively. The transactions are modelled in UML, by specifying messages exchanged between the partners in a neutral way, augmented by rules to link data between messages and business rules. The validation step is realised by allowing business experts to "play" the transactions in an animator configured by the model, by sending and receiving the messages of the transaction through a web interface: this allows them to detect errors or misunderstandings in the model, correct it appropriately and continue the animation, until the model is valid. The project also provided a methodology called "chaining", which will not be detailed in this article, to transform business requirements into a first draft of a transaction model based on existing transaction patterns. The modeling of transactions is supported by a plug-in to the UML modeling tool MagicDraw UML . All the tools developed during the project will be soon released under the GPL.

This article first details the modeling of dynamic aspects of the transaction, of static aspects, and of additional rules, and finally describes the validation of the transaction.

## Dynamic Aspects: Choreography of Messages

The dynamic models of the transaction represent the exchanges of business information between the different roles taking part in the transaction. This information must be divided in messages, each message being sent from one role to another at one time of the transaction. This dynamic model describes these exchanges, their order and the synchronisation points.

This choreography is defined in UML activity diagrams: in these diagrams, we use swim-lanes to specify the different roles. Each role undertakes some activities, whose impact is the sending or reception of messages that are represented as object flows, either as output or input of these activities. Other UML constructs can be used, like forks, joins,

and decisions (the latter in a limited way, as for now only choices between messages are supported).

the activity diagram. Nested transactions are modelled using UML sub-activity states, on which we specify input pins that map the roles of the main

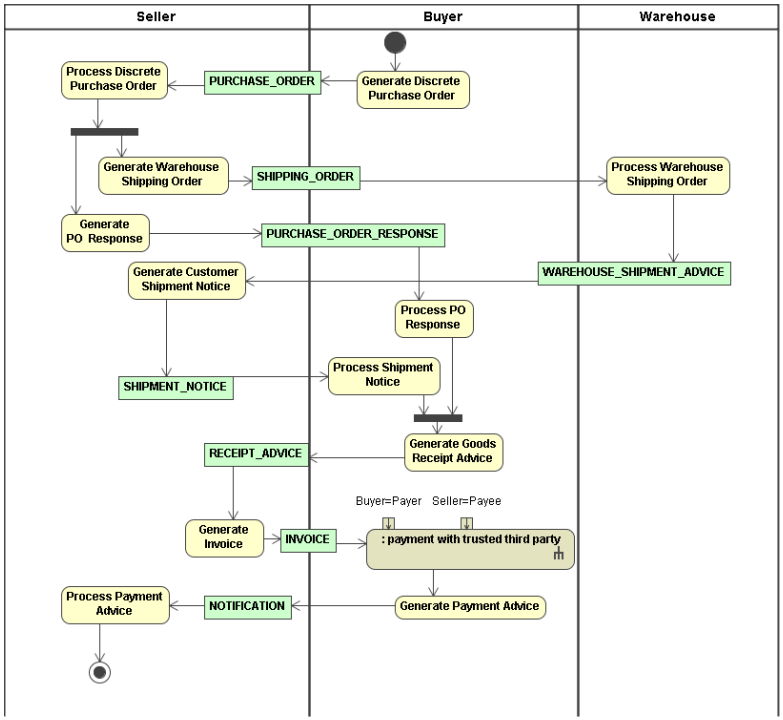



Figure 1 Example of transaction activity diagram

Finally, nested transactions can be used to call another transaction inside the activity diagram, for example to simplify

activity diagram from the roles of the nested activity diagram. Reusable transaction patterns are also modelled using nested transactions, the main difference being that we provide a wizard that

"instantiates" the pattern by replacing formal parameters with values of the calling transaction.

## Static Aspects: Structure of Messages

Each message exchanged during the transaction has to be specified using a class diagram. In our approach, we suggest beginning by creating a global class diagram corresponding to the business domain and defining all the required concepts; message class diagrams are then created by using the classes of the business domain, hiding the unwanted attributes or relations and adapting them to a message structure.

Because message class diagrams model XML messages, they therefore need to respect some constraints. In particular, they shouldn't contain any operations, and the diagrams should follow a tree-like structure, with a root class, only oriented associations and no loops.

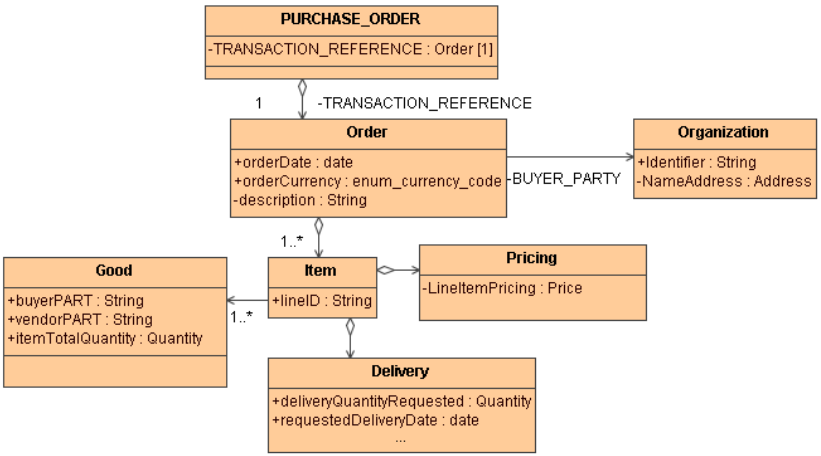



Figure 2 Example of a message class diagram

## Modelling Additional Rules

In order to specify fully the transaction, we support adding some constraints that cannot be expressed in UML diagrams. We differentiate two kinds of constraints, the inter-message rules and more complex business rules.

## Inter-Messages Rules

Inter-message rules are necessary to link data between messages of the transaction. For example, the name of partners should be coherent throughout a transaction. We defined two kinds of inter-messages rules: "optional" rules only hint that the same values should be used, but without enforcing it, while "mandatory" rules add a constraint to check that the values are the same. We model Inter-Message Rules with notes on class diagrams, each note linked to one element (class, attribute or association) of the diagram, and containing the path to the linked element of the other diagram, in an XPath-style syntax.

In our tools, we have developed different ways to create these rules: they can be written manually or by using a small user-interface, or default rules can be generated (and modified later) thanks to an algorithm taking into account the order of messages in the activity diagram and generating rules wherever corresponding elements are found in previous messages.

## Business Rules

Sometimes, more complex constraints need to be expressed, in particular relating to business needs: these are called business rules. They can be used for example to check that a payment date is not expired, or that premium customers benefit from interesting prices.

In our toolset, we have chosen to use an open source rules engine called Drools / JBoss Rules to express and evaluate these rules. The selected rule language needed to be expressive but also easy to use, in order for business experts to be able to specify rules without advanced knowledge of the language. Drools has the advantage of being very expressive,

and of supporting Domain Specific Languages (DSL): these map Drools expressions to parameterised sentences in the target domain language. For Efficient, we intend to define common sentences needed in eBusiness to be used as DSL, so that business users will be able to create rules by selecting among these sentences and specifying which parts of the model they apply to.

## Validation

Once a first version of the model has been created, the business experts representing the roles of the transaction can work together to animate it through our animation tool, by sending and receiving messages of the transaction as if it was already implemented. The animator tool is based on a workflow engine, and is configured by XML files automatically generated from the modeling tool. Business experts can use our web-based client to participate in the transaction: they receive notifications when they can send a message; web forms to fill messages are generated automatically based on each message's structure, and are pre-filled in case inter-message rules were defined. The animator checks each message against its structure and the corresponding business rules or inter-message rules.

This animation allows business experts to better understand the model and to check that it indeed corresponds to their needs, that no information is missing, and that the order or content of messages and rules are correct. Once the transaction has been played with sufficient scenarios, the model can be corrected/completed if errors were detected and the animator reconfigured with the newer model. This cycle can be followed until every expert agrees that the model is correct, and thus validates the model.

## Conclusion

We have proposed a methodology for the design and validation of electronic transactions based on UML and thus relatively easy to use, and containing a web interface allowing business users to validate the model prior to its imple-

mentation. This approach should help creating a platform independent model of a transaction that matches the business experts' needs, before platform specific details are added. Users needing to learn a transaction can also use it as a training tool.

The neutral approach of the choreography of messages modeled in activity diagrams, as well as the collaborative animation make Efficient particularly suited to define standards, or to help with defining transactions and messages from a neutral point of view, by involving all actors.

The results of the Efficient project have been applied on specific transactions of the financial sector; Opportunities to have other sectors benefit from the project's results would be welcome. More information (and soon software releases) can be found on http://efficient.citi.tudor.lu/

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# Water Means Life
## Armin Müller, DE

The claim of the German federal state of Rhineland-Palatinate to its eGovernment strategy for water management has been fulfilled by implementing the vitoc architecture. All stakeholders on the federal and municipality level, with their partners in the private sector and among the science institutions are able to connect in order to realise team projects faster, more efficiently and in a targeting way.

The usability of our service is what we focus on, theoretical and practical work steps of different administrations are therefore linked in a useful way. Vitoc is transporting the demanded services to the claiming level, that means the subsidiary level, in fact to the shortest intersection between citizens and the administration, namely to the municipalities and their institutional stakeholders. By integrating our services especially into the subsidiary level we optimise already existing applications and help to develop new ones directly on the subsidiary level. This means progress and advantages for all involved parties: By handling specific data and expert services centrally we reduce transaction costs. This is supportive not only for the public principals in total, but for agenda

groups, including voluntary services by proving our expertise and infrastructure.

With vitoc the water management sector shows a working possibility, which includes different management levels resulting in a multiple and sustainable resource utilisation of administrative services for local tasks, tourism purposes, for questions of building and working positions as well as for the teamwork of different agenda groups. The cooperation and the conjoining of projects are always leading to combined solutions.

It is the water managements' challenge to secure all water areas and the groundwater as part of nature and the ecosystem, and as life habitat for mankind, animals and plants. The claim of our sustainable water management is to conserve all water as most important basis of life in its amount and quality for future generations. Water means Life.

***Armin Müller, DE,*** *studied construction engineering and graduated as Dipl.-Ing. Since 1983 he has been with the Ministry of the Environment, Forestry and Consumer Protection, Rhineland Palatinate. He is the IT expert responsible for "Water Management". He is also the speaker of the Federal Republic working group "Data Management/ Reporting" and Chairman of the international GIS work groups "Mosel and Saar" (IKSMS) and "Rhine" (IKSR) as well as State representative to the EU CIS working party GIS on the Water Framework Directive.*

# Information Service with Semantics on Judicial Context

Esa Tiainen, FI

## EULIS - A central hub for European land information

EULIS (European Land Information Service) has launched in November 2006 an on-line service targeting to cover all Europe as a natural source of land information through a single access point. EULIS aims to provide world-wide access to national Land Register and Cadastre information services. The aim is to facilitate cross-border land transactions and other information needs on land. The users are also provided with a multilingual glossary application; an intelligible tool for terminology of land transactions (www.eulis.org).

## Process-based approach

Terminology has been one of the most difficult issues to agree internationally in Cadastre and Land registration field. In order to make national systems transparent a process based approach was developed for creating multilingual EULIS Glossary with generic definitions.

## Standard process diagrams

A uniform description model was introduced as common approach on essential stages and routines of different parties in land transaction process. Graphical

description model presents also the principal legal effects of transaction in each stage (Fig 1). Including all stages of the process was necessary to achieve a shared view.

- Which property can be mortgaged and at which stage (whether registration required)
- Public knowledge – security against third parties and public reliability

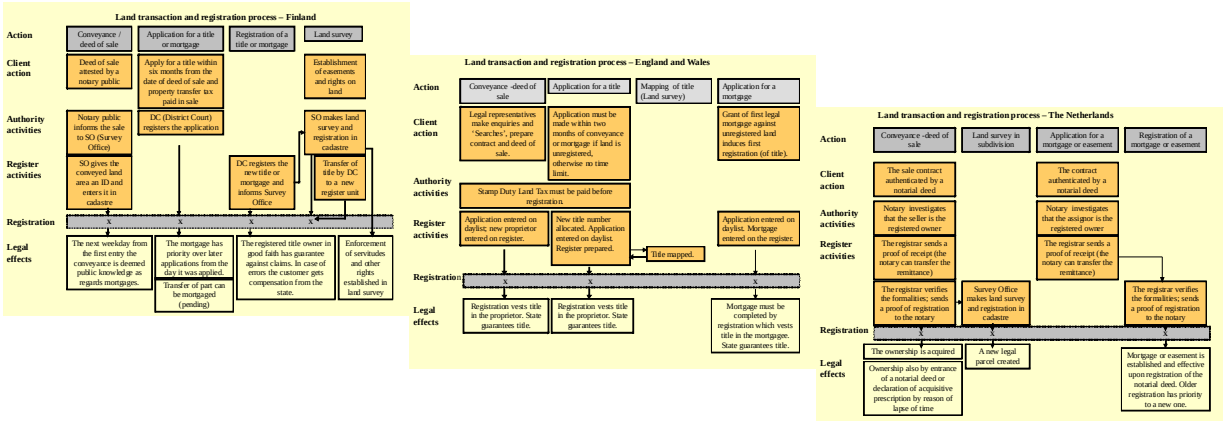


Fig. 1: Standard process diagrams; Finland, England and Wales, the Netherlands

## Judicial dimension

Important aspects in modelling were legal effects, such as

- Priorities and rights gained through registration

## Common definitions

Graphical process descriptions present also a metamodel view. With help of uniform diagrams:

- Identical phases, meanings and functions are identified
- Basic similarities are recognised

- Level of present semantic integration is discovered, and
- Common and generic definitions are depicted.

In parallel not only the differences but also the level of country specific deviations can be recognised with the analytic view, thus approaching ontology of property transaction (Fig 2: Method in defining terminology).

Property and cadastre information modeling method

- Metamodel level – Recognizing basic similarities to define the common definitions
- Conceptual level – Identifying the specific features versus common definitions

## Semantic gateways

The resulted generic definitions, EULIS-definitions, identify the semantically harmonic and common concepts, and act as semantic gateways between concepts used in different jurisdictions.

Together with the descriptions of country specific features or deviations of correspondent national terms the generic definitions make up semantic translations of national terms (Fig 3).

| Concept (EULIS) | Definition (EULIS) | **National synonym** | **National description** |
|---|---|---|---|
| Guarantee for register information | Responsibility of register authorities to compensate for losses incurred. | Rätt till ersättning av staten i vissa fall/skadeståndsansvar vid fel i vissa fall | In Land Code Chap 18 Section 4 the rightful owner is entitled to compensation from the State for his loss. Bona fide acquisition by virtue of title is possible due to Land Code Chap 18 section 1 |
| Mortgage | A right in property granted as security for the payment of a debt. | Inteckning | In Sweden a registration of the mortgage refers always to the property. When a mortgage has been granted, a mortgage certificate shall be issued on the basis of mortgage. The right of lien is granted by the property owner surrendering the mortgage certificate as security for the claim or through registration in the mortgage certificate register. |
| Mortgagee | The person to whom the mortgage is granted. | Inteckningshavare | Refers always the property in Sweden |
| Subdivision | Transferring a part of land out of a register unit. Parcelling out is often used as synonym. | Avstyckning | Unofficial parcelling of land is null and void |

Fig. 3: EULIS-term and definition, national (Swedish) synonym and specification

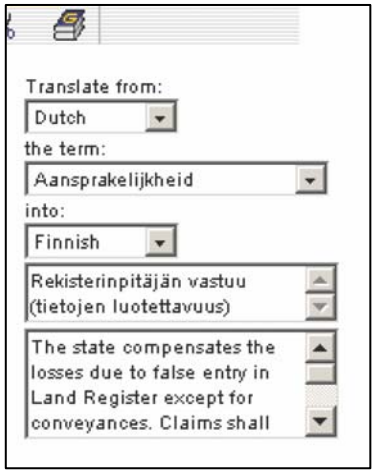


Fig. 4: EULIS Glossary application ("Guarantee for register information"

## Semantic harmonisation model

As further explication a possible semantic harmonisation model and roadmap may be envisioned for cross-discipline or cross-border interoperability, using generic definitions as semantic gateways.

As further aspects on harmonisation the approach also specifies that

- The actual level of harmonisation is recognised
- Land transactions of real property are described in an objective way
- National deviations are identified as well as meaning and level of them.

## Stepwise process

According to Visser et al (2002), a conceptual model of the context of each information source provides a basis for integration on the semantic level. They call this process context- transformation, taking the information about the context of the source providing a new context description for that entity within the new information source. They specify context-transformation by classification and context-transformation with rules (such as legal effects). Both of these apparently share the common goal of providing objective (explicit) definitions for concepts and data entities.

Furthermore we may see that semantic pre-harmonisation by creating generic definitions and terminology is a necessary prerequisite for further harmonisa-

tion, and that ontology approaches also show a larger extent of explication than the pure taxonomy of concept terms.

OGC semantic modelling approach

The essential model for semantics and information communities is defined by OGC using concepts (notions) of information communities, project worlds and sub-worlds, where integrity is achieved by testing (the unambiguity of) properties or property/value pairs:

"It should be possible to move information easily and without semantic loss from Project Worlds having naive schema into Project Worlds with more sophisticated and inclusive schema. Moving information the other way leads to truncation and loss of information. A Project World that is more naive than another is called a sub-world of the other.

Note that a sophisticated schema should not deny potential sub-worlds only because they fall outside the physical extent of its Project as specified in its Project Schema."

The OGC modelling approach is useful in semantic standardisation in specifying how to handle different user segments in creating interoperable services.

## The necessary steps

The general conclusion about the harmonisation-standardisation issue is that semantic pre-harmonisation is needed even for the purpose of standardisation. To this end, first a high-level semantic pre-standardisation view (such as the EULIS process-models) must be developed to achieve the necessary objectivity and harmonised vocabulary.

## Quality labelling of information

Applying the OGC approach the information service for standard user needs could be specified with a predefined set of selected properties and property values of information entities, and this might be taken to objective in service harmonisation and service labelling. The simple idea is to measure the quality against user needs.

The examples in table 1 offer a hint of the possibilities; a strict semantic explication enables the classification of quality with properties or property/ value pairs for legal effects e.g. different rights on land.

based on predefined standard views of different user segments.

Data on quality labelled information and services can be recorded in networks of registries and vocabularies for users to search for desired logical set of information, and to enable implementing Europe-wide interoperable applications.

| Concept | Property/value | Concept | Property/value |
|---|---|---|---|
| **Mortgage** | - No mortgages<br>- Transferable<br>- Priority ... | **Owner** | - Not yet registered (buyer)<br>- Registered titleholder<br>- Reg. cad. unit owner / not yet titled... |
| **Parcel**<br>**(Register unit)** | - Not yet registered (transfer of part)<br>- Titled, not yet registered as cadastral unit<br>- Cadastral unit with valid title / not yet valid ... | **Boundary type** | - General<br>- Boundary marks fixed, coordinate approximation / ISO classification for positional accuracy estimation<br>- Coordinate fixed / ... |

Table 1: Properties/values defining the quality

## Quality labelling of services

Another stage of quality labelling is quality labelling of information services

Table 2: Quality selection of predefined standard data set

| | |
|---|---|
| **Parcel (Register unit)** | - Titled, not yet registered as cadastral unit, **or**<br>- Cadastral unit with valid title, **or** ...<br>- (Registered leasehold unit) |
| **Mortgage** | - Yes/No, or transferable |

## Framework for semantic harmonisation

Some approaches were given as examples on how ontology explication or semantic translations can be used as surrogates to connect the existing systems to the ITC infrastructure related. A roadmap with the necessary quality assurance by quality labelling has consequently been outlined.

Terminology standardisation, where the EULIS approach was given as an example, provides a feasible knowledge base for further results.

## Concluding remarks

The information community related should agree on use of compatible methods such as semantic translators and ontologies for best benefits and to ensure sustainability of harmonisation. Integration fundamentally is not an issue of competition but co-operation.

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# Semantic Interoperability in Agriculture

Daniel Martini, DE

Documentation of agricultural practices is becoming more and more of an issue for farmers. On the one hand, they are increasingly obliged to it by legislation, on the other hand, integrative planning of agricultural production requires thorough information about measures and events in the past. In many cases, documentation has to be handed on to external partners, like e. g. government agencies or agricultural service providers. The demand for appropriate technical solutions for this purpose has become obvious. Up to now only individual interfaces between different communication partners in agriculture were available. Even if the farmer had electronic systems to record production data, the required data had to be transferred by hand from one software to another or from screen into paper forms. A standardised system for electronic data exchange offers new possibilities for information-directed agricultural production increasing sustainability and keeping adversary effects to the environment at a minimum. By allowing for an integrated view of farm production data and other data like e. g. climate or geographic data, measures can be adapted to different conditions, optionally leveraging algorithms or expert systems provided by third parties.

agroXML provides the necessary standardised language for these purposes. It

is an XML dialect to describe the production processes on the farm and the real-world objects needed to conduct them. The released versions of the agroXML schema are available at http://www.agroxml.de/schema under the W3C open source licence. In the past, development of agroXML concentrated mostly on plant production. The content of agroXML instances can basically be classified into five categories: A block providing information about the farm in general like e. g. address, name of farm manager etc., a block of data about the fields, like e. g. area and geographic coordinates, a further block of data about the cultivation on different fields, like e. g. the plant species, catch crops etc., then data about the individual measures carried out: fertilisation, seeding, pest control, tillage etc. and finally a block of data about supply items like fertilisers, pesticides, machinery etc. On the one hand, agroXML can be used to generate consistent standalone XML documents containing each of the five parts. But following the extensibility paradigm of XML, it also offers a collection of data types and elements reuseable and embeddable in other documents.

To facilitate integration with geographic services, spatial vector data are modeled in agroXML reusing constructs from the Geography Markup Language (GML) from the Open Geospatial Consortium (OGC). Technically, the reuse of GML datatypes and elements is achieved by creating a profile (a subset of necessary datatypes and elements) of GML and importing this profile together with the GML-namespace into agroXML. This approach has the advantage of allowing for a very lightweight implementation in programme code. Practical feasibility in different computing environments is an important factor while developing a data exchange standard for agriculture, especially, when it comes to integration of other XML vocabularies. Farm management information systems are written in different programming languages. Components of these management systems providing certain functionality run on a variety of hardware platforms from handhelds to powerful servers for web applications. While in theory the combi-

nation of different XML vocabularies seems desirable, in practice it often leads to large, bulky constructs unmanageable by common XML tools. However, simplicity, clarity and generality are key properties of well engineered IT systems. Therefore, one of the challenges in the future will be to allow for integration and extensibility of XML dialects while keeping unnecessary overhead at a minimum.

Besides the schema, agroXML also provides content lists. They offer the functionality of XML Schema enumerations, however the mechanism of how they are included in the schema allows to add to their content dynamically without effecting a change in the schema itself. In addition, they not only contain the enumeration values themselves but also a name and a description of the item at hand. The lists conform to a unified schema and can be downloaded at http://www.agroxml.de/content. Several lists exist containing e. g. soil types, machine types, fertiliser types, pesticides and plant variety names. Where possible, content for these lists is obtained from the respective official agencies, like e. g. the plant variety offices. Software systems implementing agroXML can either use a local copy of the content lists for filling instances or use the version on the web. Different caching strategies are possible to ensure a recent data pool even if the internet connection is only intermittent.

It is important to note, that due to the dynamic integration into an XML instance (lists are referenced by their Uniform Resource Locator), it is possible to include different lists than the ones provided at http://www.agroxml.de/content for special purposes or containing language or country-specific content.

For real world applications, the transfer of agroXML instances on the internet can be conducted using standard protocols like the hypertext transfer protocol (HTTP), the file transfer protocol (ftp) or the simple mail transfer protocol (SMTP). Exchange is best done in a document- or resource-oriented manner as opposed to message-oriented systems: either a complete agroXML document or a docu-

ment describing a certain object or process is transferred in a single file. This allows for a very simple setup of web services following the paradigm of so called Representational State Transfer (ReST). But it is also possible to embed agroXML content into messaging systems like for example ones based on SOAP.

Most of the development work of agroXML is done at the KTBL in Germany. However, agroXML is open to contributions from other stakeholders. The KTBL is providing and maintaining an infrastructure consisting of a source code management system and documentation. Coordination is done in a working group made up of the major producers of farm management information systems in Germany. Recently, an effort is going on to lift the developed XML technology onto a broader international level. There are different requirements concerning data exchange in agriculture in the different countries. This is mostly due to distinct regional agricultural practices but also due to different legislation. Integrating these different requirements will lead to challenging tasks especially concerning semantics of the data.

Further upgrading of geo-data (also raster data) functionality as well as addition of elements for livestock farming and cultivation of vegetables and fruit are currently worked on. This increasing demand from agricultural sectors other than only plant production leads to technological issues which have to be dealt with.

Especially, a schema architecture and design to allow modularisation and extensibility, while at the same time keeping internal consistency, is needed. The goal of the work is to provide a schema which can be used only in part to implement the datatypes needed for a specific application, while not breaking application interoperability. This basically calls for mechanisms to allow for more dynamic relations between data objects. In the (currently experimental) livestock farming extensions, an approach is worked out to relate basic building blocks to each other using XML linking technologies like XLink or XInclude.

At the moment, data about operating supply items, like e. g. fertilisers or pesticides are copied directly into XML instances by the farm management information systems. Suppose now, a company changes the nitrogen content of a certain fertiliser. With the current model of information integration, the farmer has to update this value in his farm management information system. If he is not aware of the change, he will transmit incorrect data in further transactions. So, in most cases, a better model would be to follow the paradigm of distributed storage and to leave this information at the place where it is produced, i.e. in the example above on a web server at the fertiliser producer, and use generic link mechanisms like the XLink Standard, to only reference the information. URIs offer an excellent system to provide globally unique identifiers. Resources like fertilisers would then be described using agroXML element hierarchies. Their relations could be modelled using the Resource Description Framework (RDF). Not only would this enable real distributed data storage and ensure recent information, but it would also enhance the possibilities to be able to build real knowledge bases for data mining and harvesting. Key factor for the success of such an architecture is a simple and easily adoptable standard.

However, especially with regard to documentation of processes, there are still some problems to solve in such a scenario of distributed storage. An infrastructure for reliable statements in RDF using strong cryptographic mechanisms to allow for identification of sources of such statements or to provide non-repudiation is still missing although recently, there are approaches described in computer science literature.

Future work on agroXML will try to address the issues described in the last two paragraphs. For agriculture as a whole, global linking of data sources would bring significant advantages. Farmers could derive useful information for planning measures on the field and in the barn. More appropriate reactions to current conditions become possible. Solving the semantic challenges in this

area will thus finally lead to more food safety and a sustainable and environmentally friendly agricultural production.

***Daniel Martini, DE,*** *studied Agricultural Sciences at the University of Hohenheim. He specialised in soil science and got deeper involved with a broad range of information technologies while working with geographic information systems and doing modelling of water and solutes flow in soils. Since 2005, he has been engaged at the KTBL in the development of the agroXML data exchange standard for farm management information systems.*

# Semantic Interoperability in Healthcare

Jörg Caumanns, DE

With buzzwording, computer science is rigid: everything static is an object, everything dynamic is a service, and when things don't work it is due to the missing "Semantic Interoperability" of objects and services.

But buzzwords are often just the marketing part of a profound problem and its solution sets. So, when we are trying to ignore the psychology of words, what does remain from "Semantic Interoperability"? Characteristically, Wikipedia classifies its own article on "Semantic Interoperability" as "confusing or unclear" (Wikipedia "Semantic interoperability" 2008). By getting back to the linguistic definition of semantics as the "theory of meaning in communication" (Saeed 2003), "Semantic Interoperability" somehow deals with the compatibility of the interpretation of the meaning of information (objects) that are exchanged between (machine) actors. Any attempt to get this more precise, e.g. by iterating through the definition of terms like "meaning" leads us to concepts like "cognition", "perception", "intention", etc. which rather call for a human mind than a machine actor's processing power.

In this short paper the recent state of the art in Semantic Interoperability in

healthcare is sketched. It is pointed out how certain constructs used there match general requirements and how this can contribute to the SEMIC.EU platform.

## Semantic Interoperability: The Building Blocks

In a common sense "Semantic Interoperability" is aiming to increase the ability of computer programs to act extensively autonomously on behalf of contexts and concepts instead of just storing and forwarding encoded data. In healthcare this general requirement can be broken down to

- being able to exchange medical and administrative information in a way that allows all physicians involved in a treatment chain to seamlessly work together,
- integrate data from different sources in order to get a complete and consistent impression of a patient's state of health,
- transfer data between different domains and purposes with no loss of information (e.g. deriving codes for issuing invoices from medical diagnoses and therapies)

As with other domains even in healthcare proprietary data formats and competing standards lead to a situation were very often PDF is the only format that can be handled by both the source and the destination IT system. This is not because there is a lack of XML Schemas in use, it's mainly because XML without any additional layers just covers syntactical issues.

The linguists' toolkit of methods for analysing and constructing language provides some useful approaches for getting hands on these additional layers:

1. the semantics of a sentence is derived from the semantics of its parts and their relationships (composition)
2. grammar as a set of building rules for sentences that is feasible to restrict the possible meanings of a sub-sentence (e.g. noun phrases, verbal

phrases, etc. in natural language)

3. in order to capture the semantics of an object language there is a meta language required that is more expressive than the object language

With the next sections these core assumptions are mapped onto Semantic Interoperability in IT. Examples from healthcare are given to provide an impression of the state-of-the-art in providing semantics on data.

## Composition

Assuming that the semantics of an asset (specification, etc.) can be derived from its parts, one of the major issues for the definition of interoperable assets is to make its composition explicit. Expliciting structure can either be done using tags within documents, by presetting a fixed structure, or by providing a manifest as a "table of contents" for an asset. Each of these approaches requires additional effort for the asset author and is hard to provide in addition to an already existing artefact.

In healthcare the HL7 Clinical Document Architecture (CDA) defines a pragmatic migration path from existing unstructured documents to completely decomposable artefacts by defining three levels of compliance:

- Level 1: the data itself is unstructured, but additional metadata corresponding to a predefined schema allow extracting main characteristics of the document
- Level 2: the data is composed into sections using defined section identifiers
- Level 3: the data is semi-structured in a way that each entry is tagged. Entries itself may be plain text, taxonomy entries, or any other format.

As an example, a patient bulletin encoded using Level 1 could be identified as a bulletin for a certain patient. Using level 2 even the section containing lab results can be identified within the document. With level 3 even certain lab

values can be extracted from the lab result section.

### Grammar and Meta Language

Plain text is usually classified as unstructured. Nevertheless every sentence is built according to certain patterns as defined by the language's grammar. Even though this does not directly lead to an automatic understanding of a statement's meaning or correctness, it helps identifying acting parties and their relationships to other objects.

Given a grammar, sentences constructed by one actor can easier be analysed according to their semantics by other actors.

In healthcare the HL7 Reference Information Model (RIM) can be seen as the common grammar for encoding medical documents and defining workflows. On a top level it provides 6 types with well defined semantics that can be used to define derived types:

- Act which represents the actions that are executed and must be documented as health care is managed and provided;
- Participation which expresses the context for an act in terms such as who performed it, for whom it was done, where it was done, etc.;
- Entity which represents the physical things and beings that are of interest to, and take part in health care;
- Role which establishes the roles that entities play as they participate in health care acts;
- ActRelationship which represents the binding of one act to another, such as the relationship between an order for an observation and the observation event as it occurs; and
- RoleLink which represents relationships between individual roles.

Special about this is, that these types cannot be combined and subtyped in an arbitrary manner but only according to given rules that rely on the types' semantics. This results in documents and process specifications where it can easily

be seen which roles participate in which acts and how they relate to other roles involved in this (or another) act.

What is missing even with the RIM is a common meta language, which would allow for a domain specific binding of concepts to "meanings", e. g. by assigning semantics to taxonomies (Smith/ Ceusters 2006). A candidate taxonomy in healthcare for filling this gap is SNOMED CT and efforts are on the way to use this standard for a semantic enrichment of the RIM.

### How this relates to SEMIC.EU

For SEMIC.EU "Semantic Interoperability" must be more than just a label on yet another collection of specifications, taxonomies, and other artefacts. Given the guidelines and policies defined for the use of SEMIC.EU the platform is on a very good way to animate the buzzword of "Semantic Interoperability". With respect to the three essential features sketched above ground is laid to establish a forward-looking platform:

- By providing means for manifests as well as for section and entry level semantic annotations different granularities and depths of composition can be supported. This is a prerequisite for an efficient re-use of existing artefacts and for pointing out semantic relationships between statements within (different) artefacts
- Well accepted grammars and meta languages can only be result of an iterative community process as done by HL7 for the healthcare domain. The SEMIC.EU clearing process accentuates the role of open communities as driving forces for standards development. For this SEMIC.EU is well set up for getting the primary platform for any (co-ordinated) development efforts addressing the common meta layers of taxonomies, specifications, core components, etc.
- The SEMIC.EU quality policy is user centric in a way that it allows for an evaluation of assets against community defined goals. As experiences from standards development in

healthcare show (e. g. the shift from release 1.0 to release 1.2 of the eCR specification), users – in contrast to developers – tend to push development towards the re-use of existing and established concepts and technologies. For this the user centric quality policy of SEMIC.EU is a great tool for enforcing that assets on this platform will be aligned. This alignment may as well be on the level of assets (e. g. by re-using artefacts or referencing other assets) as towards meta levels as sketched above (e. g. alignment for a common "grammar" and use of common taxonomies for classes and processes).

However, SEMIC.EU is just a platform providing tools for the creation of (tools for the creation of) interoperable assets. Especially the development of meta layers (grammar, templates, meta languages, etc.) and their use for further asset development can only be successful if all Member States contribute to this and recognise SEMIC.EU as the European platform for not just publishing interoperable assets but even for jointly elaborating and promoting the core concepts behind the buzzword of "Semantic Interoperability".

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# On the Semantic Domains of the European Construction

Xesús Manuel Benítez Baleato, ES

Let us stop for a moment; let us take a breath to restore the fragmented memories of the long route we covered since our common willpower on the European unity construction begun to prevail over the set of our mutual disagreements.

If we carefully look at those memories, we'll clearly find a point where the voices supporting the unity of Europe by federating its diversity managed to be heard over the still resonant noise of war. Attending to our Galician sources it is possible to locate that point at the succession of the federalist meetings which, starting at Switzerland, brought forward the Den Haag Congress on 1948 where the convenience of a political European unity was stated under the presidency of the British Premier Winston Churchill.

After that, "the construction process of the European Union will flow over the path outlined by its Treaties determining the character of the communitary institutions, extending their competencies or approving the integration of new Member States" (Nogueira 2008). The Declaration read by Schuman in 1950 will facilitate the ECSC Treaty to be signed on 1951; this one will be followed in 1957 by the Treaties of Rome

(EEC and EURATOM) finally joining all together in the 1965 Merger Treaty when the previous existence of the BENELUX Treaty helped to define a first core composed of Germany, Belgium, France, The Netherlands, Italy and Luxembourg. After that, the union would continue growing with the arrival of a common budget mechanism from the Treaty of 1970 and the Accession Treaties of the UK, Denmark and Ireland in 1973.

The Budgetary Treaty in 1975 created the ECA (European Court of Auditors) -a body intended to audit the accounts of the three communities: ECSC, ECC and EURATOM- and also granted the rights of the Parliament to reject and approve the execution of the Commission Budget. Between 1979 and 1986 will follow the Adhesion Treaties of Greece, Portugal and the Spanish State -along with the Greenland Treaty. The Single European Act (SEA) extended the EEC competencies, strengthening the Parliament functions and establishing the objective of the Internal Market for 1992.

In that same year the Treaty on European Union is signed, consolidating the Parliament through the co-decision procedure, introducing new forms of cooperation between Member States in key fields -like defence, justice or home affairs-, determining new communitary policies in education or culture and -especially relevant- creating the Economic and Monetary Union (EMU) deciding a set of economic convergence criteria as exchange rate stability in order to achieve a common currency.

The accessions of Austria, Finland and Sweden until 1995 will precede the Treaty of Amsterdam in 1997 which will produce consolidated versions of the previous Treaties going deeper in aspects as the co-decision and qualified vote procedures in a similar way as the next one: the Treaty of Nice in 2001, entered into force in February 2003. The Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia acceded to the EU in 2004 before Romani and Bulgaria, who accessed in 2007.

This first segment of European unity construction ended just in that year with the Treaty of Lisbon signature when, in order to go forward on the unity process it was necessary to modulate the constitutional nature of the adopted in 2004 by the Heads of State and Government at the Brussels European Council but never ratified Treaty establishing a constitution for Europe.

After that first era, delimitated from the BENELUX to the Lisbon Treaty, we are asking ourselves about the future steps on the European unity construction. Could it be possible to continue with the enlargement process of the European Union? Could we continue going deep in the 'de facto' internal European federalisation process as the organic evolution of the stateless nations and regions is showing us? Could our experience to be reused by other regions in the world having similar problems as those we faced in the middle of the past century? Of course we will need to identify the right questions if we want use useful answers but we'll also need to identify the proper language to do them; and it might be a European wide understandable language. Which one? Let's do some 'information retrieval' work in order to identify some candidate.

Given the fact that all those Treaties are indeed texts -and therefore that they can be thinkable and processable as the large sets of character strings they are-, it could be possible to collect all them in a single data file which could include their amended and consolidated versions as well as all the legal literature generated from the institutions and procedures they'd instantiated during the last fifty years. What that aggregation mechanism has produced then is a textual corpus suitable to be processed by the computational methods used in linguistic research in order to extract and format its core linguistic resources -i.e. glossaries, dictionaries, thesauri or taxonomies- and then to describe the syntax and even the grammar of a very interesting linguistic superset: just that one which allowed us, Europeans, to go forward with our unity establishing mutual relationships outside the field of bellic violence for more than fifty years.

After all that Computational Linguistic research now we have identified a sort of meta-language that demonstrated to work quite well in the past. But: has it expired with the constitutional issue or could it still work from now? May it also help us to express and solve our doubts on the future steps of the European unity and, consequently, about our common future? Answering this is again a linguistic matter: to that one dedicated to identify what that 'meta-language' can express or talk about; which are its valid senses, meanings or acceptations and therefore: which are the concepts that conform the ontology managed by that language. At the end, what we'll need to do in order to go forward with the construction of the European unity process is to identify common semantic domains and to apply on them our successfully tested meta-language.

Of course, we will need to improve our meta-language in order to make it compatible with new semantic domains and to solve eventual errors and warnings. Let us do a first approximation.

Semantically data mining the previous textual corpus, soon we will find a continual common interest about the European production system related concepts. First the coil and steel industry integration (ECSC), then the uranium one (EURATOM), the budgetary and financial system (EEC/ EC), the common market and the currency policy (the EMU), the common agriculture and fisheries policies (CAP and CFP) or the structural and cohesion funds (ERDF, ESF) are good examples of that.

It seems to be clear that our meta-language works quite well on the semantic domain of the European economical production system so if we want to continue using that meta-language in an as-is basis, then we will need to identify a common interest production system. Just taking a look around, it will be easy to agree on the suitability of the semantic field linked to the Information and Communication Technologies as a good candidate given the real challenges driven by ICT introduction in all the orders of our modern societies.

Focussing on ICT production system terms can be framed on the Information and Knowledge Society development and, from a European perspective, on the Pan-European eGovernment Services (PEGS) deployment.

The final question is: could it be possible to apply our meta-language in the 'PEGS deployment' semantic domain? Is our meta-language ready or might it be improved in order to continue with the European unity construction process? This question will be answered by our citizens, business and public administrations during the next years, as they are the users -or speakers- of that meta-language. Because PEGS relies on interoperability -and as interoperability is clearly a matter of European construction- one can be optimistic, specially noticing that IDABC is working on the background.

Moreover the success of projects like the EIF, the Open Source Migration Guidelines or, more recently, the OSOR, IDABC's SEMIC.EU will facilitate the convenient Semantic Interoperability needed to a successfully PEGS deployment. That Semantic Interoperability will establish -from the end-user perspective- transitive relationships between the elements of different sets: an expression which can be used to talk about both unity and identity concepts.

With IDABC's SEMIC.EU initiative now it is possible to find a symbolic junction point between both necessary ways -the institutional or unity one and the cultural or identity one- because semantics relies in the background -even when the assets have completely different natures on each field. Once again IDABC is providing the European construction with the necessary tools just in time.

Now: time to resume this break in our half a century itinerary. Time to continue walking through the European unity way, each one with its own load and all together in the same way. Over the last millennium wayfarers crossed all Europe arriving to Galicia in their search of the 'Finis Terrae'. If tiredness arrived at their spirit, the strength was recovered when hearing from others the ancient salutation: Ultreia! Times

changed from then, and now our roads are becoming electronic so let's update that salutation for a more proper one to strengthen our willpower in the European aboutness: Interoperability!

***Xesús Manuel Benítez Baleato, ES,*** *is Leader of the Government of Galiza (Xunta de Galicia) FLOSS. He is deeply involved in the use of ICT for social empowerment, he has worked as Systems Administrator since 1992, both in private and public sectors. Since 2007 he is the Coordinator of mancomun.org, the FLOSS Reference and Services Center of the DG Industry Promotion and InfSoc, Innovation and Industry Council, Government of Galiza (Xunta de Galicia). Baleato was born in 1974 in Lippstadt, Germany.*

# Category Theory Praxis - The Semantic Interoperability Case

Charalampos Meletis, GR

This paper proposes the use of Category Theory, a branch of pure Mathematics, as an appropriate Framework for dealing with Semantic Interoperability issues.

The proposal is based on the author's Ph.D. Thesis, where as a mathematician and lover of abstract algebraic structures, he formulated a theory based on Categories, concerning Cognitive applications of Cybernetics, such as Analogical Concept Formation, Learning etc. These application cases have been treated considering the concept of Analogy as a mapping of semantic and context related characteristics between his Category-like structures which represent concepts of knowledge domains.

Thus, on the occasion of the present Conference, which coincides with the 30th Anniversary of my Ph.D., I'm taking the opportunity to put forward the above proposal of the innovative application of Category Theory as a research tool for treating Semantic Interoperability problems. A possible application to Knowledge Management research is also envisaged.

## Prolegomena

Interoperability describes the ability and the tools needed for direct communication and synergy between different information and communications systems and organisational units based upon common standards, technologies and concepts.

Interoperability demands a shared understanding of information and an adjustment of data structure, which on the technical level means that heterogeneous devices (e.g. a mobile phone and a computer) can communicate to each other via a commonly agreed protocol (e.g. Bluetooth).

## Semantic Interoperability (SEM-IOP)

Semantic Interoperability exists if in a data exchange between two systems, the data is interpreted in the same way by both systems ruling out misunderstandings and excluding misinterpretations which lead to semantic conflicts.

In order to ensure Semantic Interoperability, a standardised language is needed or a commonly agreed platform is required which enables two systems exchange information without any kind of human intervention.

The purpose of the communication between two systems is to carry out all the work needed in harmonised synergy as, for example, in the case of discovering, synthesising and delivering to a citizen a requested eGovernment service at national (NEGS) or at pan-European (PEGS IDABC) level.

To provide this sort of semantic consistency in Public Administrations applications at national and pan-European cross-boarder cross-sector (meta)level we need to develop and use at all levels a common language which amounts to the definition of a unified form of data representation and an appropriate semantics.

We must ensure that meta-information is described in such a way that it is interpreted consistently by all parties, as for example in the simple case of whether the <first name> field of an

address record may contain several names or just one.

Among some proposals that have been made so far, including new ideas regarding SEM-IOP, we quote from (Rossiter et al 2006) who in his work 'A Natural Basis for Interoperability' argues:

''1. Need for Formal Natural Multi-level Type Systems.

Interoperability needs natural techniques to deal with levels of types. To handle (non-local) interoperability, formality (for reliability and predictability), naturality (for reality) and multi-level types (for types of types) are all required.

Categorical methods should replace classical models because models are local and interoperability is non-local. Categorical methods provide formal definitions of levels (as categories), mappings between levels (functors between categories) and comparison of one mapping between levels with another (natural transformation between functors). Categorical techniques are also natural: an arrow within a category is defined as unique up to natural isomorphism.'', and

''4 Discussion.

One of the purposes of developing a formalism for a problem area is to provide a rationale in which standards can be planned and discussed. It is perhaps only in the ideal world that standards are based entirely on a theoretical basis. Nevertheless some of the idiosyncrasies and inconsistencies of SQL have been attributed to not rigorously applying axiomatic set theory to the standard.

Category theory is a promising candidate as a formalism to assist in the preparation of an interoperability standard because of its pedigree as a workspace for relating different mathematics. The work here has shown that it can indeed perform this role with information systems and cover three critical areas of data structuring, constraints and manipulation (process) in an integrated manner. Recent advances in category

theory are likely to improve its match with reality: 2-categories enable some of the strict criteria for composition and associativity to be relaxed to some extent.''

Furthermore, I would like to mention that despite that in the existing SEM-IOP initiatives, there is an agreement to use XML as the framework for data exchange, this does not enable IT systems to communicate each other and interoperate, in the same way as 'stringing together correct words of a language does not necessarily make a meaningful sentence'.

In view of the above considerations a question which arises to me is: are we on the right track (theoretically and methodologically) towards the ultimate goal of achieving a most globally accepted methodology and solution to the Semantic Interoperability issue?

Taking all these into account I would propose to look very carefully to Category Theory as an appropriate framework due to its inherent:

- data/content representation generality and clarity
- semantic virtues and
- computational characteristics.

I would like to put forward the following concrete actions:

4. A Forum (under the umbrella of SEMIC.EU) to gather together people, research centres, organisations
5. State of the art. A relevant study to be carried out.
6. Coordination of research efforts at European level
7. Workshop or Conference (possibly in Greece to the honour of Aristotle, founder of his categories)
8. a number of pilot studies
9. a number of well defined projects for pragmatic results

Our ultimate aim is to introduce the Eilenberg - McLane's Category Theory into the Semantic Interoperability meta-level towards the 'standardisation of a communication language' among the relevant European scientific community dealing with open questions and problems of a semantic nature, during the course of communication between living and non-living organisms.

## Epilogue

There is still a long way to go before some kind of true Semantic Interoperability will be achieved.

***Charalampos Meletis, GR,*** *works within the Ministry of the Presidency and Ministry of Interior in various posts and projects regarding Government IT Strategy, IT standards, eGovernment. He is the Ministry's representative to IDABC, i2010 eGov and European FP6 project regarding Semantic-Gov. In Athens he studied Mathematics and holds a Master in Computer science and a Ph.D. in Cybernetics from the UK. He is the founder (1988) of the Greek Artificial Intelligence Society.*

# Technologies for Semantic Interoperability
Jan Gottschick, DE

We all share the big dream of becoming a common European Nation. But for historical and man made reasons Europe is a large community incorporating various languages, cultures and Member States. All these aspects entail communication problems between persons and organisations from different places. The same postal address could be written in various forms (see figure 1), which are difficult to match with each other. The postal address can have a free form or structured format using different dividers, orders, details or names to describe

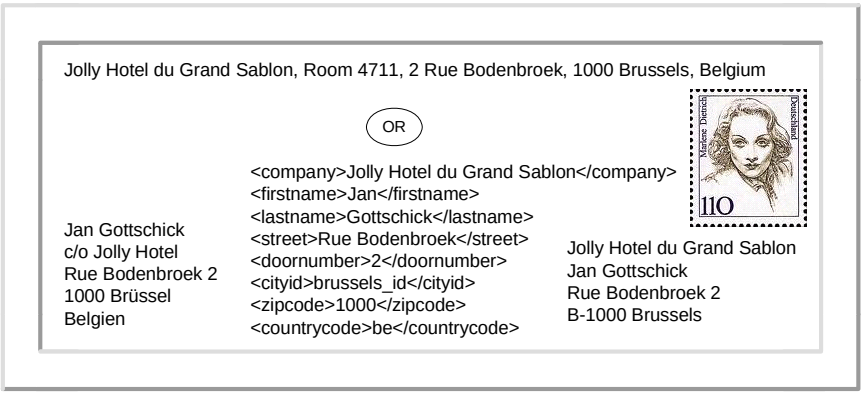



Figure 1: Various forms of post addresses

the same target. This small example shows the importance of overcoming the syntactical and semantic interoperability issues.

exchange data and to enable sharing of information and knowledge." In practice this could be done by harmonising data format and terms among all related

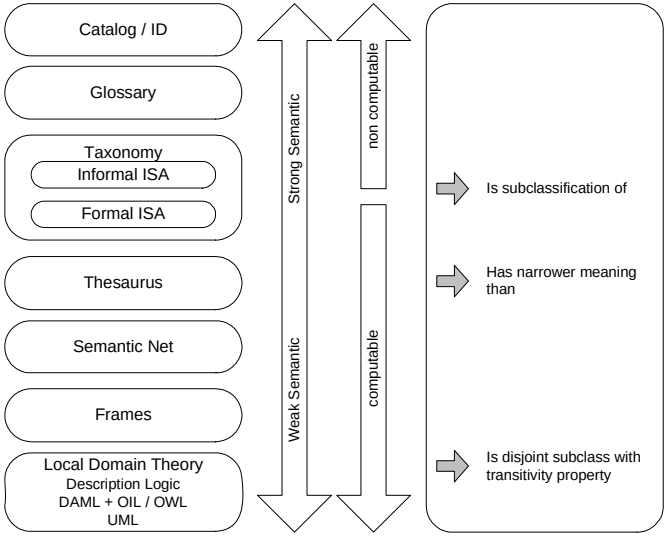



Figure 2: Modified Ontology spectrum based on McGuinnes et al (2002) and Daconta et al (2003)

According to the European Interoperability Framework v1.0 (European Commition 2004), "Interoperability means the ability of information and communication technology (ICT) systems and of the business processes they support to

parties. Another option is the soft migration towards this long term goal by mapping data between cooperating parties. This approach will be taken by SEMIC.EU. To map data between different systems and contexts well known

knowledge based and data migration technologies are available to solve the various kinds of problems arising. On a syntactical level, the reassignment of structured fields could be simple; however, the analysis of unstructured text to extract data and facts could require highly sophisticated technologies like text mining. On a semantic level knowledge based structures need to be created which include the terms and their relationships to model facts. This could be rather simple by mapping various representations, synonyms or languages of a term like Brussels respectively Bruxelles to a unique ID which is used as an intermediate representation. Further, more imprecise methods are required if a unique mapping is not possible.

In figure 2 the spectrum of ontology technologies is shown. The spectrum includes basic relationships for generalisation/specialisation of concepts, more complex models using all kind of relationships and semantic models using additional logical descriptions. The most important aspects of using a specific technology depend on the required semantic expressiveness and the effort of computing the mapping.

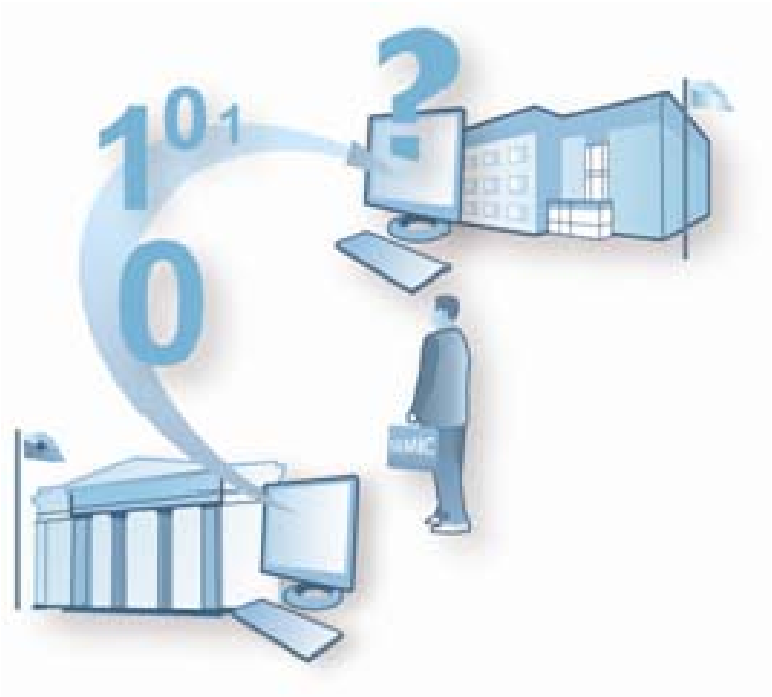
Using common generalised terms a taxonomy allows mapping of terms, which do not map exactly. A glossary should be used for documentation purposes to enable a common understanding about the used terms in the targeted domain. A thesaurus allows the modelling of synonyms (several terms with the same meaning), homonyms (one term with several meanings) and translations between several languages. A semantic net and frames are useful to describe more complex facts, which should be mapped as a whole. There are no longer restrictions regarding the types of relationships between concepts (terms). The most general approach requires adding logical descriptions, e.g. to implement conditions or rules before applying the knowledge.

The challenge for Semantic Interoperability assets is to find the right approach by taking care of the complexity of creating a semantic model at development time and the efficiency of computing the mapping at runtime. It has to be

decided how exact, imprecise or incomplete the mapping should be for a practical approach with respect to the end users expectations. Coaching the asset owners and asset users regarding the syntactical and semantic issues as well as providing well-proven and innovative standard solutions are major tasks in the project SEMIC.EU. Finally, the most important goal of SEMIC.EU is to solve the various challenges of syntactic and Semantic Interoperability arising from various incompatible systems, languages and cultures as given throughout the European Member States.

***Jan Gottschick, DE,*** *is researcher at the Fraunhofer ISST. His research foci are semantic technologies, search technologies, web technologies and system architectures. He was the technical project manager and CTO of a joint venture for the implementation of a portal product, using semantic matching technologies for search and navigation. In the SEMIC.EU project he is mainly responsible for the development of concepts and guidelines.*

# 3. Project Profiles



# Partners and Projects of SEMIC.EU


# agroXML

## Association for Technology and Structures in Agriculture

| | |
|---|---|
| **Category / Scope** | Agriculture / Pan-European |
| **Project Duration** | Started 2004 |
| **Aims and Objectives** | Better efficiency, avoidance of errors and cutting red tape in the agricultural sector |
| **Topics addressed** | Agriculture, Food industry, Supply industry |
| **Languages** | English, German |
| **Participating countries** | Austria, Estonia, Ireland, Germany, Hungary, Lithuania, Sweden, Switzerland, Slovenia |
| **Get in contact** | Dr. Martin Kunisch m.kunisch@ktbl.de<br>Dr. Jürgen Frisch f.frisch@ktbl.de<br>Mario Schmitz m.schmitz@ktbl.de<br>Daniel Martini d.martini@ktbl.de |

## About agroXML

agroXML is a standardised language for data exchange in agriculture. It is based on the eXtensible Markup Language (XML) using XML Schema as its definition language. AgroXML is used to submit data from farm management information systems to external partners, like e.g. Product processing industries in the food supply chain or agricultural service providers. In addition, data about operating supplies like fertilisers or pesticides can be made available to the farmer by their respective suppliers. In the future, using XML linking technologies might provide a dynamic and flexible mechanism to link documents to such external information sources.


# AVSEC

## Automated Voice Services for EU Citizens

| | |
|---|---|
| **Category / Scope** | Cross-sector / Pan-European |
| **Project Duration** | |
| **Aims and Objectives** | Define a standard specification for the usage of speech enabled solutions for citizen use |
| **Topics addressed** | Speech communication to citizens |
| **Languages** | English |
| **Participating countries** | Germany |
| **Get in contact** | Detlev Artelt, aixvox GmbH detlev.artelt@aixvox.com |

## About AVSEC

AVSEC defines a standard for simple voice communication of citizens with authorities. Automation allows citizens service lines and other solutions to offer current news and information at any time. All possible data systems can be queried clearly and target oriented by voice. All major international suppliers of voice solutions and voice portal software are requested to work together with AVSEC.


# e-BiT

## eBusiness Training

| | |
|---|---|
| **Category / Scope** | Cross-sector/National |
| **Project Duration** | Started 2006 |
| **Aims and Objectives** | To raise the level of knowledge and competence in the e-commerce field of SMEs. To promote e-learning and the use of electronic equipment as a new way of effective learning. To raise awareness and knowledge of e-commerce, e-procurement, e-logistics and law issues concerning electronic economy of all interested parties. |
| **Topics addressed** | Enterprise in the e-economy, Selling on the Internet, Finance in e-economy, Logistics in e-economy, Law in e-economy, Transactions in e-economy, E-fulfilment. How to boost your ordering, E-procurement. How to boost your procurement |
| **Languages** | Polish, possibly English, German |
| **Participating countries** | Poland |
| **Get in contact** | Joanna Wrobel, Institute of Logistics and Warehousing , 6 Estkowskiego ST., 61- 755 , Poznan, Poland |

## About E-Bit

EBIT is an e- learning platform allowing people to increase their qualification at any time, place and pace. The project was originally designed for the private sector. Its main functionality is in a widespread ability to increase the level of knowledge of employees in a highly modern and cost-effective way. The main purpose of the project is to disseminate a very unique and new knowledge known to few, about e-economy tools, good practices and ways of implementation among all interested parties, however originally addressing the project to SME as the target group. Its application for administration lies in its interoperability.

# eFA

## electronic Case Record

| | |
|---|---|
| **Category / Scope** | Justice/National |
| **Project Duration** | Started 2006 |
| **Aims and Objectives** | The eCR/eFA project was launched in 2006 by major German hospital providers. In early 2008, release 1.2 of the eCR specification was published, which allows for a secure exchange of medical data between institutional care providers. The further development of the specification will be a co-operation with IHE Europe. |
| **Topics addressed** | Medical records, Interoperability of medical care providers, Reusable components (business and security) |
| **Languages** | German, English |
| **Participating countries** | Germany |
| **Get in contact** | Dr. Jörg Caumanns<br>Fraunhofer ISST joerg.caumanns@isst.fraunhofer.de<br>Mollstr. 1, 10178 Berlin, Germany |

## About eFA

The eCR/eFA project was launched in 2006 by major German hospital providers. In early 2008, release 1.2 of the eCR specification was published, which allows for a secure exchange of medical data between institutional care providers. The further development of the specification will be a co-operation with IHE Europe.

# EFFICIENT

## The science behind transaction modelling

| | |
|---|---|
| **Category / Scope** | Cross-sector/National |
| **Project Duration** | 2002 - 2009 |
| **Aims and Objectives** | Providing a toolset for modelling, animation and validation of electronic messages between multiple partners. Creating models of the whole e-commerce environment prior to IT developments and assisting e-commerce groups with the creation, execution and communication of standards |
| **Topics addressed** | Semantic interoperability, Sharing of concepts and data models (harmonisation), Improving the quality of data exchange |
| **Languages** | English, French |
| **Participating countries** | Luxembourg |
| **Get in contact** | Don Martin donald.martin@tudor.lu<br>Public Research Center Henri Tudor, 29, avenue J. F. Kennedy, L-1855 Luxembourg |

## About EFFICIENT

Organisations that develop new e-commerce standards and structures first need to come to agreement on what information needs to be shared and with whom. EFFICIENT allows both technical and non-technical audiences to interact with an e-commerce model (just as if it were already built) before beginning costly development. Semantics are addressed in that each member of the organisation can "see" what information is being exchanged. This ensures that everyone agrees on semantic issues prior to development.


# EuDiS

## European District System

| | |
|---|---|
| **Category / Scope** | Administration/National |
| **Project Duration** | 2004 - 2019 |
| **Aims and Objectives** | Offer interoperability and electronic back-office for all public institution of Mehedinti like a Software as a Service (SaaS) inside of a package of services<br><br>Offer electronic front-office for all citizens of Mehedinti District |
| **Topics addressed** | Integrated information system, Interoperability, Electronic identity, Service oriented architecture |
| **Languages** | Romanian |
| **Participating countries** | District (region) Mehedinti, Romania |
| **Get in contact** | Vintila Cornel corvin@edata.ro<br>121, Dudesti st, Bucharest, Romania |

## About EuDis

A project company called the European District System (EuDiS) Mehedinti was created to build a technical infrastructure for public institutions in the Mehedinti region of Romania, including the Mehedinti District Council and all local authorities. The district council joined forces with CG&GC Intelligent Technology and a number of other business partners to build a central technology platform using Microsoft® Windows server technologies and the Microsoft E-Government Starter Kit, which supports services through an integrated Web portal, a call centre, and traditional counters.

Mehedinti District Council also deployed internal accounting and taxation tools, a geographic information system, and the GoPro.net solution for case management. XML Web services connect applications, departments, and local authorities at district level. The partnership implemented a central technology platform and regional data centre, developed using the Microsoft .NET Framework and based on Microsoft Windows server technologies. These technologies support a range of service delivery channels, including an Internet portal, call centre, over-the-counter service, and employee-assisted "one-stop shops," where citizens can receive a range of public services.

As a guide for development, EuDiS Mehedinti used the E-Government Starter Kit (eGSK), a platform based on the Microsoft BizTalk® Server 2006 integration engine. Using the eGSK, every application is integrated into a central portal. As a result, employees in different areas of the organisation, including the call centre, have access to accurate, up-to-date data. The organisation also shares a single infrastructure for networking and security technologies. Public administration employees throughout the Mehedinti region are now working with common, fully integrated applications and databases. This allows them to process cases fairly and uniformly. As a result, the consistency of service standards has improved across the region, with the roles and responsibilities of each public employee strictly defined. Administrators can now compare the activities of different local councils and assess the performance of different departments within councils.


# EULIS

## European Land Information Service

| | |
|---|---|
| **Category / Scope** | Cross-sector/pan-European |
| **Project Duration** | Started 2002 |
| **Aims and Objectives** | World-wide access to European electronic land and property information and accurate, up-to-date and reliable property information across Europe |
| **Topics addressed** | Land and property information, Cross-border service, cross-discipline service, Land transaction and land administration |
| **Languages** | |
| **Participating countries** | Sweden, Finland, Scotland, Norway, Austria, England and Wales, Lithuania, the Netherlands, Ireland, Iceland, Czech Republic, Slovak Republic, Slovenia, Latvia, Poland, Germany, Northern Ireland and others |
| **Get in contact** | Esa Tiainen esa.tiainen@nls.fi<br>Stefan Gustafsson, Service manager stefan.gustafsson@lm.se<br>National Land Survey of Finland, P.O.Box 84 FIN-00521 Helsinki |

## About Eulis

EULIS launched in November 2006 an online service targeting to cover all Europe as a natural source of land information through a single access point. EULIS aims to provide world-wide access to national Land Register and Cadastre information services. The aim is to facilitate cross-border land transactions, use of real property as collateral and other information needs on land. The users are also provided with a multilingual glossary application; an intellegible tool for terminology of land transactions.

Additional income streams to national Land Register organisations by selling products to other countries through EULIS portal – professional users simply log on to their existing national Land Registration information provider in order to get access to the EULIS portal. EULIS will be extending its service content based on market needs.

# INTERPRANA

## Interoperabilità evoluta

| | |
|---|---|
| **Category / Scope** | Administration/pan-European |
| **Project Duration** | 2004 - 2007 |
| **Aims and Objectives** | Public Administrations Interoperability<br>Citizens high value services<br>Inter-region/country service gateway |
| **Topics addressed** | Interoperability, Federated identity, Strong authentication |
| **Languages** | Italian, German, Ladin, Slovenian |
| **Participating countries** | Italy: Friuli Venezia-Giulia Region |
| **Get in contact** | Lusiella Marcucci luisella.marcucci@regione.fvg.it<br>Regione Autonoma Friuli Venezia Giulia, Servizio E-Government,<br>Via Giulia, 75/1 - Trieste |

## About INTERPRANA

The new citizen service portal of Friuli Venezia Giulia is based on an SOA architecture compliant with IDABC standards. It has a federated solution for authentication, based on OASIS SAML standard and multi-factor authentication. In its scope, semantics for a basic civil registration set of services have been developed. Processes are now managed across administrative units and municipalities. Municipalities, citizens, public administration and private organisations are involved in the project.


# JHS

## Public Administration Recommendations

| | |
|---|---|
| **Category / Scope** | Administration / National |
| **Project Duration** | 2006 - 2009 |
| **Aims and Objectives** | Disseminating good practices<br>Promoting and enabling interoperability<br>Developing public sector eServices and eGovernance |
| **Topics addressed** | Interoperability of information systems, Use of common data sources, User interfaces, Data security and privacy protection, Good practices in the public sector service development |
| **Languages** | Finnish (main), Swedish, English |
| **Participating countries** | Finland |
| **Get in contact** | Tommi Karttaavi tommi.karttaavi@vm.fi<br>Ministry of Finance, PO Box 28, FI-00023 GOVERNMENT |

## About JHS

The Public Administration Recommendations (JHS-recommendations) provide information management guidelines for public administration (both governmental and municipal). A JHS-recommendation can be a uniform procedure, definition or instruction to be used in public administration. The JHS-system aims to improve the interoperability of information systems and the compatibility of data in them, to facilitate cross-sector process development and to make the use of existing data more efficient. The recommendations also aim to minimise overlapping development work, guide the development of information systems and facilitate good common practices in public administration. The recommendations are approved by the Advisory Committee on Information Management in Public Administration (JUHTA) and the writing process is co-ordinated by the JHS-section, appointed by JUHTA.


# mancomun

## Open Source Reference and Services Center of Galicia

| | |
|---|---|
| **Category / Scope** | Cross-sector/National |
| **Project Duration** | |
| **Aims and Objectives** | To promote the consolidation of a native ICT framework capable of responding to the technological demands of citizens, administrations and the different production sectors in Galicia.<br><br>Implementing of resources and services typical of the Information and Knowledge Society through the integration of Galician cultural identity elements, especially those related to the Galician language. |
| **Topics addressed** | FLOSS, Open Standards, eGov services |
| **Languages** | Galician (main), Spanish, English |
| **Participating countries** | Mainly Galicia (Spain), Extremadura and Andalusia (Spain), Floss (Brasil), Portugal and projects participating in InterregIVc. |
| **Get in contact** | Xesús Manuel Benítez Baleato suso.baleato@xunta.es |

## About mancomun

The Open Source Reference and Services Center of Galicia is devoted to providing resources and services that promote the implementation of the open source and open standards that encourage innovation and technological development in Galicia. All efforts are worth to strengthen the Galician and international FLOSS community (Brasil) through the dissemination, sponsorship and participation in the most important initiatives, events and organisations.


# MoReq2

## Model Requirements for the Management of Electronic Records 2

| | |
|---|---|
| **Category / Scope** | Cross-sector/pan-European |
| **Project Duration** | 2007 - 2008 |
| **Aims and Objectives** | Define a standard specification for the management of electronic records an a conforming XML Schema<br><br>Develop a test framework to support the testing of software for compliance with the above |
| **Topics addressed** | Electronic Records Management |
| **Languages** | English. Translation has started into Russian, French, Slovenian |
| **Participating countries** | Australia, Belgium, Canada, Czech, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Malta, Netherlands, Norway, Portugal, Russia, Slovenia, Spain, Sweden, UK, USA |
| **Get in contact** | Marc Fresko marc.fresko@serco.com<br>Serco Consulting, New London Bridge House, 25 London Bridge Street, London SE1 9SG, United Kingdom |

## About MoReq2

Development of a standard generic specification of requirements for the management of electronic records, to be usable in all sectors and across the entire Union. This is an evolutionary development of the earlier, successful, MoReq specification. One result of this project is that it provides a mechanism (the XML Schema) for the interchange of electronic records between different electronic records management systems. The project was funded by the EC'S IDABC initiative and executed by Serco Consulting. Contributions come from individuals and organisations (companies, software suppliers, academics, consultants, government employees etc.). All major international suppliers of electronic records management software, and many national and regional suppliers, agreed to support the MoReq2 project.

# NJR

## Network of Criminal Registers

| | |
|---|---|
| **Category / Scope** | Justice/pan-European |
| **Project Duration** | Started 2003 |
| **Aims and Objectives** | Electronical Interconnection between Member States Criminal Registers and speeding up the exchange of information<br><br>Aid for better understanding of information transmitted in a foreign language |
| **Topics addressed** | Judicial cooperation, Penal Law, Criminal records |
| **Languages** | French, German, Spanish, Czech, Slovak, English, Polish, Slovene, Italian, Portuguese, Dutch |
| **Participating countries** | France, Germany, Spain, Belgium, Czech Republic, Luxembourg, Slovak Republic, United Kingdom, Poland, Slovenia, Italy, Portugal, Netherlands |
| **Get in contact** | Dr. Wilfried Bernhardt bernhardt-wi@bmj.bund.de<br>Federal Ministry of Justice, Mohrenstr. 37, 10117 Berlin |

## About NJR

The technical and the legal basis for the electronic exchange of information had to be determined. A common format for the datasets had to be created. It was necessary to agree on a table of offences (finalised) and a table of decisions (not yet finalised) to allow better understanding of the received information.


# OIO

## The OIO-catalogue

| | |
|---|---|
| **Category / Scope** | Administration/National |
| **Project Duration** | 2007 - 2009 |
| **Aims and Objectives** | Establishing synergy between public infrastructure, IT architecture and standardisation components. Facilitate public use of standards and continued standardisation. |
| **Topics addressed** | Standards, Web Services, Entrance to public IT architecture |
| **Languages** | Danish and some English |
| **Participating countries** | Denmark |
| **Get in contact** | Thomas Maarup tpm@itst.dk<br>Holsteinsgade 63, DK-2100 Copenhagen, Denmark |

## About OIO

The project aim is to establish a single entrance to public IT architecture and standardisation by improving usability of existing components and by enabling connection between different types of standards and services stored decentralised.


# OSCI-XMeld

## Interconnecting registry offices

| | |
|---|---|
| **Category / Scope** | Administration/Pan-European |
| **Project Duration** | Started 2004 |
| **Aims and Objectives** | Better interconnectedness of registry offices in Germany and extension to other administrations<br><br>Interoperability between administrative standards |
| **Topics addressed** | Data exchange in the system of registration and cross-area administrative, Automated generation of XML Schemas and the specification based on a specific UML model |
| **Languages** | German |
| **Participating countries** | Germany |
| **Get in contact** | Hannes Weber hannes.weber@finanzen.bremen.de<br>Die Senatorin für Finanzen in Bremen<br>Referat -E-Government- Rudolf Hilferding Platz 1, 28195 Bremen |

## About OSCI-XMeld

The aim of the development project OSCI-XMeld was comprehensive interconnectedness of all German registry authorities on the application level. A common standard was developed supporting business processes in German civil registration involving all the players in the field (5500 municipal authorities) avoiding trouble-creating media breaks. The network was launched successfully on 1st January 2007. Ever since, connecting further areas of administration to the processes in civil registration has emerged as a main objective as well as the facilitation and enhancement of the networks' stable operation. OSCI-XMeld is a part of the German eGovernment strategy and is associated with the development of OSCI-Transport (a standard targeting secure eGovernment communication via the Internet) and the development of a service registry (DVDV - eEurope Award 2007).


# R4eGov

## Research for eGovernment

| | |
|---|---|
| **Category / Scope** | Administration/pan-European |
| **Project Duration** | 2006 - 2009 |
| **Aims and Objectives** | Provide practical tools that offer sustainable, secure and shareable pathways to cross-border and cross-administration interoperability. |
| **Topics addressed** | Cross-border and cross-administration interoperability, Security, Collaborative workflows |
| **Languages** | English |
| **Participating countries** | Belgium, France, Italy, UK, Netherlands, Germany, Austria |
| **Get in contact** | Athina Dalamanga athina.dalamanga@be.unisys.com<br>Avenue du Bourget, 20, 1130 Brussels |

## About R4eGov

R4eGov is a project co-funded by the European Commission's DG INFSO to help tackle one of the major challenges facing eGovernment today: the ever increasing mobility of people and transactions across and within national boundaries. Most eGovernment initiatives have been created as stand-alone applications, which now need to communicate with each other.

Demonstrate research results on security, interoperability and collaborative workflows through the deployment of two pilot prototypes based on two real life case studies using a set of generic features which can be applied to any solution.

a) An interoperability gateway rendering completely electronic the lifecycle of legal texts in Austria;

b) An interoperability gateway for cooperation and electronic exchange of information between Eurojust, Europol and the Belgian Federal Public Service of Information, Technology and Communication (Fedict).

Show the applicability of our research results to different end users in the field of eGovernment through the creation of User Groups. Participation to the User Groups offers the opportunity to User Group participants to follow closely the project's progress and share with R4eGov their experiences as well as have access and offer feedback or suggestions for improvement with the proposed solutions.

The project is realised by a consortium of 20 partners in 7 EU Member States.


# RIDE

## Roadmap for Interoperability of eHealth Systems

| | |
|---|---|
| **Category / Scope** | Health/pan-European |
| **Project Duration** | |
| **Aims and Objectives** | Real life use cases, user requirements and quality attributes for the successful handling of interoperability problems<br><br>Open source solutions |
| **Topics addressed** | Electronic Healthcare Record Standards, Healthcare business processes, Clinical decision support systems, Security, privacy and legal issues, Ontologies, Semantic Web Initiative and OWL |
| **Languages** | English |
| **Participating countries** | Turkey, Germany, France, Italy, Greece, Ireland, Belgium |
| **Get in contact** | Prof. Dr. Asuman Dogac asuman@srdc.metu.edu.tr,<br>Software R&D Center, Department of Computer Eng., Middle East Technical University, 06531 Ankara, Turkey |

## About RIDE

RIDE is a roadmap project for interoperability of eHealth systems leading to recommendations for actions and to preparatory actions at the European level. Economical, legal, financial and technological challenges for the industry shall be. RIDE identified how the current state of the art healthcare standards can be enhanced and looked at e.g. clinical guidelines in order to achieve Semantic Interoperability. It is involved in dissemination activities: workshops assisting the roadmapping process and is in close cooperation with standardisation bodies. The roadmap has prepared the ground for future actions as envisioned in the action plan of the eHealth Communication COM 356. RIDE coordinates various efforts on eHealth interoperability in Member States and associated states. Special emphasis in the project is on Semantic Interoperability and Open source solutions. As a recent update you can have a look at a research portal that gives information about intermediate results of the project and vision statements.


# RISER

## Registry Information Services on European Residents

| | |
|---|---|
| **Category / Scope** | Administration/pan-European |
| **Project Duration** | Started 2004 |
| **Aims and Objectives** | Single-Point-of Access for address verification in European public registers for private and public sector<br><br>Reducing administrative barriers for private and public sector in the use of services of civil registration authorities |
| **Topics addressed** | Exchange of migration data between registry authorities (eRISE), Address verification in the IMI (European Services Directive), European information service for citizens (eMOVE) |
| **Languages** | German, English |
| **Participating countries** | Austria, Estonia, Ireland, Germany, Hungary, Lithuania, Sweden, Switzerland, Slovenia |
| **Get in contact** | **Hendrik Tamm, RISER project manager hendrik.tamm@riserid.eu** |

## About RISER

RISER is a Trans-European eGovernment service which enables companies and administrations to request and verify address information throughout Europe in a simple and cost-effective way. The service is supplied by national or local authorities with data from the respective registries. It provides a Single-Point-of-Access for its customers via a secure internet infrastructure based on open standards.

RISER enables its customers to submit inquiries without knowing in advance of the diversified requirements (semantics, organisational, legal and technical) to access the desired data in the various Member States.


# SemanticGov

## Services for Public Administration

| | |
|---|---|
| **Category / Scope** | Administration/pan-European |
| **Project Duration** | 2006 - 2008 |
| **Aims and Objectives** | SemanticGov aims at building the infrastructure (software, models, services, etc) necessary for enabling the offering of semantic web services by public administration (PA). |
| **Topics addressed** | Registry Information |
| **Languages** | English (Italian, Greek) |
| **Participating countries** | Netherlands, Belgium, Italy, Greece, Germany, Bulgaria, Ireland, Austria |
| **Get in contact** | Dr. Charalampos Meletis c.meletis@yap.gov.gr |

## About SemanticGov

SemanticGov aims at building the infrastructure (software, models, services, etc.) necessary for enabling the offering of semantic web services by public administration (PA). Through this cutting edge infrastructure, SemanticGov will address longstanding challenges faced by public administrations such as achieving interoperability amongst PA agencies both within a country as well as amongst countries, easing the discovery of PA services by its customers, facilitating the execution of complex services often involving multiple PA agencies in interworkflows. More importantly, this infrastructure will exploit SemanticGov as an enabler for total reengineering of PA service provision and propose a paradigm shift of today's modus operandi.

The consortium consists of a complementary set of top-level scientific partners, world-leading industrial companies and user partners capable to take up SemanticGov results. This composition secures the successful execution of the project as well as the widest exploitation of its results.

Semicolon

# SEMICOLON

## Semantic and Organisational Interoperability in Communicating and Collaborating Organisations

| | |
|---|---|
| **Category / Scope** | Cross-sector/National |
| **Project Duration** | 2007 - 2011 |
| **Aims and Objectives** | Development and testing of ICT-based methods, tools and metrics to obtain faster and cheaper semantic and organisational interoperability both with and within the public sector |
| **Topics addressed** | Semantic and organisational interoperability, Information modelling, Methods and tools, Metrics |
| **Languages** | Norwegian, English |
| **Participating countries** | Norway, UK |
| **Get in contact** | Terje Grimstad terje.grimstad@karde.no,<br>Karde, P.O.Box 69 Tåsen, N-0801 Oslo, Norway |

## About SEMICOLON

Semicolon is a research project partly funded by the Norwegian Research Council. It addresses the challenges to establish compatible ontologies, information models and the necessary organisational coordination and collaboration to simplify public service production across several public bodies.

Four large and influential public bodies provide collaboration cases as study items for the project: the Directorate of Taxes, the Brønnøysund Register Centre, the Directorate for Health and Social Affairs and Statistics Norway. The organisations performing the research are Det Norske Veritas (DNV, the coordinator and project owner), the company Karde (initiator of the project), consultancy Ekor and the Norwegian Centre for Informatics in Health and Social Care, KITH. The University of Oslo and the Norwegian School of Management as well as the universities of Manchester and Aberdeen provide expertise in semantics, object orientation and organisational theory.

The project will develop ICT-based methods, tools and metrics through research based experiences in real collaboration cases where the aim is to produce public electronic services to industries and citizens. Due to stove-piped budgeting and evaluation principles in the public sector, the Semicolon project will address collaboration and coordination issues that would not have been addressed by the individual organisations alone.


# SIM

## Semantic Interoperability Models

| | |
|---|---|
| **Category / Scope** | Cross-sector/National |
| **Project Duration** | Started 2007 |
| **Aims and Objectives** | Comparing different semantic technologies (RDF/OWL, Topic Maps, UN/CEFACT Core Components, UML, ISO 15926) and to develop a "maturity matrix"- when and how to use semantic technologies<br><br>Create awareness in the public sector for interoperability |
| **Topics addressed** | Semantic interoperability, Challenges for the public sector, Market needs and value proposition |
| **Languages** | English and Norwegian |
| **Participating countries** | Norway |
| **Get in contact** | David Norheim david.norheim@computas.no<br>Arild Haraldsen arild.haraldsen@norstella.no<br>NorStelle, C.J. Hambros Place 2c, Oslo, Norway |

## About SIM

SIM is oranised as a project within InterOp – a task force within NorStella consisting of all relevant semantic groups in Norway. Based on a common understanding of what Semantic Interoperability means in technical terms, the project wishes to develop an awareness and understanding from a market/user perspective of the value of using (mixed) semantic technologies.

# TURKSAT

## Türksat Satellite Communication Cable TV and Operation A.S

| | |
|---|---|
| **Category / Scope** | Audiovisual and Media/National |
| **Project Duration** | |
| **Aims and Objectives** | Single point of e-services and information portal<br>Central user authentication and authorisation<br>Payment gateway for public payments |
| **Topics addressed** | Technical interoperability, Services integration, Information portal |
| **Languages** | Turkish |
| **Participating countries** | Turkey |
| **Get in contact** | MUSTAFA CANLI mcanli@turksat.com.tr<br>TÜRKSAT A. . KONYA YOLU 40. KM GÖLBA I - ANKARA / TURKEY |

## About TURKSAT

TURKSAT is the architect and manager for the IT infrastructure of eGovernment projects in Turkey. Currently the eGovernment portal of Turkey is being designed in cooperation with different government agencies. It will connect government offices, create a secure communication gateway and standardise metadata protocols. The portal will support various types of access media and mobile services via cell phones or hand-held computers. Citizens will be able to access the system using smart cards and connected certificates. Features include central authentication for electronic services and a central payment/banking module for government agencies. Government offices and branches will get a secure networking layer including VPN and encrypted network connections to create two way secure communication channels. In addition, a network of disaster recovery centres will be formed to ensure network continuity and data protection from all disasters.

The UDEF

# UDEF

## Universal Data Element Framework

| | |
|---|---|
| **Category / Scope** | Cross-sector/global |
| **Project Duration** | Started 1999 |
| **Aims and Objectives** | Developing the UDEF as an open standard<br>Legal agreements<br>Develop metadata management products and enterprise applications and systems e.g. Inclusion of e-commerce applications |
| **Topics addressed** | Semantic Indexing, Public Standard supporting Semantic Interoperability conformant with ISO 11179, Multilingual semantics |
| **Languages** | English, selected parts will be multilingual |
| **Participating countries** | USA, Canada, UK, Netherlands, Germany, Denmark, Australia, India, South Africa |
| **Get in contact** | Arnold van Overeem arnold.van.overeem@capgemini.com<br>Capgemini, POBox 2575, 3500 GN Utrecht, Netherlands |

## About UDEF

The UDEF Project is a project of the Semantic Interoperability Working Group of The Open Group. Its aim is to support the Universal Data Element Framework (UDEF), which is a framework for standard machine-actionable semantics that enables the interoperability of disparate data schema. UDEF's vision that it is established as the universally-used classification system for data element concepts.

# VitoC

## Virtual workspaces for multiteam-oriented Communities

| | |
|---|---|
| **Category / Scope** | Cross-sector/pan-European |
| **Project Duration** | Started 2005 |
| **Aims and Objectives** | Citizen and Civil Society<br>Business (industry) and Business (free agent)<br>Administrative<br>Intermediaries |
| **Topics addressed** | Virtual community, Networking |
| **Languages** | French, English, German |
| **Participating countries** | France, Luxembourg, Wallonia, Germany |
| **Get in contact** | Armin Müller armin.mueller@wwv.rlp.de<br>Ministerium für Umwelt, Forsten und Verbraucherschutz Rheinland-Pfalz, Kaiser-Friedrich-Straße 1, 55116 Mainz |

## About VitoC

VitoC is designed for the relationships between users of the eGovernment matrix (internal eGovernment/back office: G2G, external eGovernment/front office: G2B, G2C, G2NGO). VitoC is used for national and international groups of experts (F, LU, Be, De) as a working platform and for communication/coordination of data (compilation, classification, evaluation, provision internally and externally, for example: GMES/GSE land).

Work groups of administrations, consultants and local authorities work in VitoC with work environments which are task-, profile or subject specific. Administrations network the information services vertically (subject track) and horizontally (adjacent disciplines/involvement in the process) with VitoC. Public e-services for Citizens and for Businesses: Data provision through subscriber services, provision of maps (geodata) through subscriber services.

Other services: integration service, assistant supported compilation of geodata/maps and provision for administrations, business and science.

Administration to administration service: import/export services, geotransformation, application networking.

Internal administration service: improvement management, feedback from those involved in the process, user management.

The application environment (tools, services, data) and the lines of communication (intranet, extranet, Internet, e-mail, SMS, information service) are compiled by the users (local authorities, businesses, administrations) across the levels depending on the situation based on the tasks.

# XAusländer

## A Deutschland Online project

| | |
|---|---|
| **Category / Scope** | Administration/National |
| **Project Duration** | 2007 - 2010 |
| **Aims and Objectives** | Development of a standard for the exchange of data on foreigners<br>Better data quality, faster availability and greater security, a first release of the standard by mid-2010 and |
| **Topics addressed** | Creation of an information model, Modelling single modules for data exchange between any public administrations |
| **Languages** | German |
| **Participating countries** | Germany |
| **Get in contact** | Hartmut Sprung xauslaender@bamf.bund.de<br>Bundesamt für Migration und Flüchtlinge (BAMF)<br>Abteilungsleiter für Internationale Aufgaben, Migrationsforschung, IuK, Frankenstraße 210, 90461 Nürnberg |

## About XAusländer

The project develops a common standard for sharing data concerning foreigners. A common standard is needed to optimise communication among foreigners authorities and between them and all other agencies, courts, associations and institutions that collect and manage data on foreigners. Based on XML, the new standard will enable all communication partners to integrate and process the necessary data using their own specialised systems. In the future, this will eliminate the need for different agencies to collect and keep track of identical data and reduce the volume of paper files. Issues on the agenda are interfaces to other projects of the XÖV initiative like XMeld and XPersonenstand.


# XDOMEA

## XÖV Standard

| | |
|---|---|
| **Category / Scope** | Administration/National |
| **Project Duration** | Started 2005 |
| **Aims and Objectives** | Support of business processes and records management<br>Facilitation of data exchange between authorities<br>Fostering independence from particular products and facilitation of comprehensive eGovernment applications |
| **Topics addressed** | eGovernment |
| **Languages** | German |
| **Participating countries** | Germany |
| **Get in contact** | Dr. Andrea Hänger a.haenger@barch.bund.de |

## About XDOMEA

As a project of the "Deutschland online" initiative, XDOMEA was established for the development and updating of the XÖV standard for IT based exchange and IT-based transfer of records. It facilitates seamless exchange of metadata and business process information regarding records and their aggregations as well as the exchange of content and metadata avoiding changes in medium. The new standard connects paper based and electronic processes.

# 4. Speakers and Authors

# Keynote Speakers at the SEMIC.EU Launch Conference

**Wilfried Bernhardt**
Germany

Mr Bernhardt was born on August 13, 1954 in Lübeck. He is married with three children. After studying law in Augsburg, he became an academic assistant at the Institute for Public Law in Trier. He received his doctoral degree in 1987 with a dissertation on the topic of European Law. From 1985 to 1991, Wilfried Bernhardt served as Counsellor in the Federal Ministry of Justice of Germany. He worked as personal counsel to the minister, and later headed the Ministry's division for parliamentary and governmental affairs. From 1991 to 1996 he worked for the Land of Saxony-Anhalt. He represented the Land in Bonn, Germany's former capital. He returned to the Federal Ministry of Justice in 1996 and became head of the Ministry's personnel division. In 1998 he was promoted to Deputy Director General for administration, and is now the Chief Information Officer of the German Federal Ministry of Justice. During the German EU Presidency, he co-chaired the Working Group for Legal Data Processing (E-Justice) of the Council in Brussels. He is currently the leader of the German delegation to this Working Group.

Mr Capell holds a master of Electrical Engineering degree from Imperial College of Science & Technology, University of London. Since 2002 he is a director of Red Wahoo. Steve has led several interoperability projects for both business and government sectors. He is the WG Chairman of the international standard development project UN/CEFACT e-Business. Additionally he is a member of the OASIS ebBP ,and UDDI working groups. Steve is the architect of both the BizDex B2B and the GovDex G2G projects.

**Steve Capell**
Australia

Mrs Colas deals in the Ministry of the Budget, Public Accounts and Public Service in the General Directorate for State Modernisation in France with the development of inter-ministerial projects in simplification, front-office and eGovernment. Working for the French administration her main actions were firstly related to the facilitation of interoperability between information systems, in particular the harmonisation of business processes and data exchanges. She is also involved in the initiatives of the European Commission's IDABC programme, SEMIC.EU Advisory, CAMSS and EIF

**Sylvie Colas**
France

Mr De Vriendt is a Dutch speaking Belgian who holds a nuclear engineering degree and a post-graduate degree in IT. He started to work for the Commission in what is now the Information Society and Media directorate-general, following-up research projects related to software engineering. From 2005 to 2006, he was responsible, in the Enterprise and Industry DG, for the pan-European eGovernment services unit, which is responsible for the IDABC programme. Since 2007 January the 1st this programme is part of the INFORMATICS Directorate-General.

**Karel de Vriendt**
Belgium

Mr Fuligni graduated in computer science. Since 1999 He has been working for the Italian National Agency for Digital Administration (CNIPA), the government body responsible for the implementation of the eGovernment plans in the Public Administration. He has been having the responsibility of the design and the development of the national architecture for the interoperability among public administrations (also known as SPCoop – Interoperability Public System). He is a member of the IDABC eID Interoperability Expert Group and of the IDABC SEMIC.EU Advisory Group.

**Stefano Fuligni**
Italy

Mr García Morán holds a degree in Mathematics from the University of Seville and a degree in Computer Science from the Polytechnic University of Madrid. He started his carrier at the University of Seville and Ministry of Education and Science of the Regional Government of Andalusia where he worked as a head of IT service. Since he joined the European Commission in November 1986, he has continued working in the IT area, first at the Informatics Directorate and then at the Directorate-General for Translation. In 2001 he was appointed Director of Informatics at the Directorate-General for Personnel and Administration. He was responsible for establishment of the Directorate-General for Informatics (DIGIT) in May 2004 of which he was appointed Director General in November 2005. The Directorate-General for Informatics defines the IT strategy of the European Commission, provides its ICT infrastructure and since January 2007 is also responsible for the IDABC programme (Interoperable Delivery of pan-European eGovernment Services to public Administrations, Businesses and Citizens). He is member of the Management Board of ENISA.

**Francisco García Morán**
Spain

Mr Kaplan is responsible for IT operations and eGovernment Gateway project of Turkey. Prior to becoming CIO at Turksat, Dr. Kaplan served as Director for Information Technologies and Director of Strategy Planning and Project Development at the same company. Kaplan studied at Georgia Institute of Technology as post doctorate researcher. He holds a doctorate and master's degree from the Erciyes University, and bachelor's degree from Bilkent University.

**Ahmet Kaplan**
Turkey

Mr Laudi is the Programme Officer responsible for the Semantic Interoperability measures within the IDABC Unit, European Commission. Mainly, he is responsible for the management of the Semantic Interoperability Centre Europe, SEMIC.EU. Aldo comes from the Maltese National Administration where he used to occupy the role of the eGovernment Corporate Programmes Manager in the ICT in Government Unit. Aldo has a back ground in social sciences and a Masters in Business Administration from the Maastricht School of Management. Aldo is also ITIL certified and PRINCE 2 Practitioner

**Aldo Laudi**
Malta

Mr Meletis works within the Ministry of the Presidency and Ministry of Interior in various posts and projects regarding Government IT Strategy, IT standards, eGovernment, Ministry's representative to IDABC, i2010 eGov and European FP6 project regarding SemanticGov and else some. In Athens he studied Mathematics and holds a Master in Computer science and a Ph.D. in Cybernetics in UK. He is the founder (1988) of the Greek Artificial Intelligence Society.

**Charalampos Meletis**
Greece

Mr Reichling holds a diploma in computer science and is acting as principal consulting for the ]init[ AG. Klaus joined ]init[ in 2001 and is member of the companies management board, where he is responsible for the strategic direction of ]init['s consulting unit. Until 2001 Klaus was employed at IBM Global services, where he first started as a student, became consultant and finally project manager in a couple of IT infrastructure projects. Over the last ten years, he has successfully managed a variety of national and international eGovernment and eBusiness projects. With the award of the contract for the SEMIC.EU project to ]init[ and it's partners, Klaus was assigned as the project manager.

**Klaus Reichling**
Germany

Mr Schultz Eeg is Head of Standardization Division at National IT and Telecom Agency in Denmark. The Standardization Division promotes standardization within the public sector and between the public and private sector. In addition to data standards, the Division is increasingly engaged in the standardization of processes, and in the interdependence between standardization enterprise architecture. Per Schultz Eeg has formerly worked at Local Government Denmark in the same field.

**Per Schultz Eeg**
Denmark

Mr Siponen has been the CIO of the Finnish Ministry of Defence since May 2008. Before that he worked in Ministry of Finance as the State Chief Enterprise Architect in the State IT Management Unit. He also has years of experience in consulting public sector organizations and private businesses in business-IT alignment, enterprise architecture as well as ICT transformation and a long career in the energy sector product development, business analytics, business processes and ICT-systems development.

**Aki Siponen**
Finland

Mr. Jan Timmerman is a Policy Coordinator in the Public Sector innovation and information policy department of the Ministry of the Interior and Kingdom relations. He is a member of various IDABC and INFOsoc expert groups and the Technical Working Group of the IDABC program. His expertise is on eGovernment, information security, digital signatures and electronic identity management.

**Jan Timmerman**
The Netherlands

Mr Tortorelli worked for CNIPA (the national agency that supports and implements eGovernment policies delivered by the Minister for innovation in Public Administration) as director of interoperability and applicative cooperation unit since 1999. In this role, he manages relevant public tenders providing interoperability services to the Italian Public Administrations. This unit is responsible for the deployment and the update of SPCoop (model, architecture, services and compliance), in accordance to the National interoperability framework, defined in the law decree named "digital administration code".

**Francesco Tortorelli**
Italy

# Authors

Mr Benítez Baleato is Leader of the Government of Galiza (Xunta de Galicia) FLOSS. He is deeply involved in the use of ICT for social empowerment, he works as Systems Administrator since 1992, both in private and public sectors. Since 2007 he is the Coordinator of mancomun.org, the FLOSS Reference and Services Center of the DG Industry Promotion and InfSoc, Innovation and Industry Council, Government of Galiza (Xunta de Galicia). Baleato is born in 1974 at Lippstadt, Germany.

**Xesús Manuel Benítez Baleato**
Spain

Mr Caumanns is head of a research group at the Fraunhofer ISST, which is focussed on IT architectures for healthcare and eGovernment. He has been the technical project manager for the German Electronic Health Card (2004/2005) and is recently managing a consortium of major German hospitals which jointly develop a standard for the exchange of patient data between medical facilities.

**Jörg Caumanns**
Germany

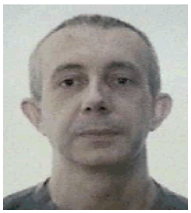
Mr Gottschick is researcher at the Fraunhofer ISST. His research foci are semantic technologies, search technologies, web technologies and system architectures. He was the technical project manager and CTO of a joint venture for the implementation of a portal product, using semantic matching technologies for search and navigation. In the SEMIC.EU project he is mainly responsible for the development of concepts and guidelines.

**Jan Gottschick**
Germany

Mr Grimstad has been a research scientist and research director at the Norwegian Computing Center (1980-1994). He has served one year in the European Commission as a scientific officer (1995). He has been the director for systems development and electronic services in ErgoGroup (1996 -2003). He is now the general manager for Karde.

**Terje Grimstad**
Norway

Mr Grosso is a data administrator for the CSI Piemonte, since 2001. He specialized in IVECO – conceptual data modelling. For Piedmont Public Administration he took care of the metadata repository. Additionally Batini and Grosso implemented a method for obtaining repository of conceptual schemas by likeness and inference.



**Riccardo Grosso**
Italy

Mr Haraldsen is general manager of NorStella, a private non-profit foundation for e-business and trade facilitation. Arild Haraldsen is Head of Delegation to UN/CEFACT Management Forum. His organisation is actively participating in UN/CEFACT and CEN/ISSS working groups. Haraldsen is head of NordiPro – a co-operation between the "pro"-organisations in the Nordic countries. Haraldsen has also written several textbooks on strategy and e-business strategy

**Arild Haraldsen**
Norway

Mr Luts received a Master of Sience in IT Governance from Tallinn University in 2004 and is currently a Ph.D. student at Tallinn University of Technology. Martin has expert knowledge and experience in knowledge engineering, information system engineering and auditing, data quality. Since 2005 Martin has actively leaded Estonian public sector's semantic initiative. Since 2007 he serves as national expert at European Commission's IDABC program as a member of SEMIC.EU Advisory Group

**Martin Luts**
Estonia

Mr Martini studied Agricultural Sciences at the University of Hohenheim. He specialized in soil science and got deeper involved with a broad range of information technologies while working with geographic information systems and doing modelling of water and solutes flow in soils. Since 2005, he is engaged at the KTBL in development of the agroXML data exchange standard for farm management information systems.

**Daniel Martini**
Germany

Mr Van der Maas studied History at the University of Leiden, Netherlands, specializing in Methodology and philosophy of science. In 2004 he started as an ICT architect at ICTU for the program streamlining of base-data. He was one of the founding architects at ICTU for the NORA, the Dutch Government Reference Architecture. Currently he is an architect at ICTU at the Dutch eGovernment Knowledge center and works on semantics, Semantic Interoperability, base-registrations, metadata and develops NORA further.

**Emile van der Maas**
Netherlands

Mr Müller studied construction engineering and graduated as Dipl.-Ing. Since 1983 he has been with the Ministry of the Environment, Forestry and Consumer Protection, Rhineland Palatinate. He is the IT expert responsible for "Water Management". He is also the speaker of the Federal Republic working group "Data Management/ Reporting" and Chairman of the international GIS work groups "Mosel and Saar" (IKSMS) and "Rhine" (IKSR) as well as State representative to the EU CIS working party GIS on the Water Framework Directive.

**Armin Müller**
Germany

Mrs Sophie Ramel obtained her engineering degree specialized in computer sciences and applied mathematics in 2001 from high school ENSEEIHT in Toulouse, France. She then joined the Public Research Center Henri Tudor / CITI department (Center of Innovation by Information Technologies) in the Grand-Duchy of Luxembourg to work on different research projects, as an R&D engineer, and later as a project leader and scientific coordinator.

She worked on different projects, often using XML technologies in open environments: she worked on projects about an exchange format and tools to share and manage trainings catalogues, about open source tools, and on the Efficient project concerning the design and validation of B2B transactions.

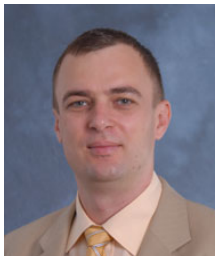
**Sophie Ramel**
Luxembourg

Mr Reinhardt has been a Member of the Board of Directors of ]init[ AG since 1 January 2006 where he is responsible for Technical Solutions and Innovation.

Ulrich Reinhardt has been at ]init[ since 2000. He heads the Mainz branch office and is Key Account Manager for specific applications and systems integration.

**Ulrich Reinhardt**
Germany

Mr Szigeti has a Masters degree in electrical engineering and an MBA degree. His main professional fields are computer networks, IT security and eGovernment. Currently he is working at the Centre of Information Technology of Budapest University of Technology and Economics. He is responsible for the IT security and the interoperability sub-projects in the currently running eGovernment framework project.



**Szabolcs Szigeti**
Hungary

Mr John Sheridan is Head of e-Services at the Office of Public Sector Information in the UK, part of The National Archives. John works at the intersection of information technology, information policy, the web and online service delivery. He has both a strategic and an operational role within government. Strategically, John provides thought leadership about the web, how it is changing and how this relates to the re-use policy and the wider information management agenda in government. Operationally John is responsible for the delivery of a range of innovative web based services, including all UK Primary and Secondary Legislation and other official publications, such as the London, Belfast and Edinburgh Gazettes.

**John Sheridan**
United Kingdom

Mrs Jeni Tennison is an independent consultant currently contracted to The Stationery Office who are working for the Office of Public Sector Information. She specialises in XSLT and XML Schema development with forays into AJAX and RDF. She trained as a knowledge engineer, gaining a PhD in collaborative ontology development, and since becoming a consultant has worked in a wide variety of areas, including journal publishing, medieval manuscripts, legislation and financial services. She is author of several books including "Beginning XSLT 2.0" (Apress, 2005).

Jeni was an invited expert on the W3C's XSL Working Group during the development of XSLT 2.0 and was one of the founders of the EXSLT initiative to standardise extensions to XSLT and XPath. She is currently working on the XProc pipeline definition language as an invited expert on the W3C's XML Processing Working Group, on the Layered Markup and aNnotation Language (LMNL), and on the DataType Library Language (DTLL).

**Jeni Tennison**
United Kingdom

Mr Tiainen is currently at the Development Centre of National Land Survey (e.g. spatial data infrastructures); internationally he is dealing with e.g. EULIS, Re-use of spatial information in Russia and Land Administration in Armenia (EU-Twinning). Previously he worked as Chief Planning Officer in the Metropolitan Area Council on regional information services, statistical and research co-operation.

**Esa Tiainen**
Finland

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## 6. Notes