



COIN

Enterprise **CO**llaboration & **IN**teroperability



Report

Trends and opportunities in interoperability standardisation: the perspective of the COIN Integrated Research project

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1. Executive summary

This report is the outcome of an activity committed by the COIN Integrated Research project (www.coin-ip.eu) with the goal to collect, analyse and frame relevant standardisation activities which are related to the COIN Project, and to assess them against the current development status of the COIN project.

COIN is an integrated research project supported by the European Commission Seventh Framework Programme (EU FP7), focused on technologies and business models related to **Enterprise Collaboration and Interoperability**.

The aim of COIN is to define methodologies, technologies and business models that will enable the “COIN vision by 2020” to come true.

For the purpose of disseminating the project outcomes, COIN has created a community, the so called “COIN Angels”, aiming to play an active role of “ambassadors and evangelists” of the COIN vision and results. The activity reported in this report is part of such an initiative.

This report has been produced by a task force of *COIN Angels*. A workshop was organized to widen the discussion about the criticalities of interoperability standardisation: the Standardisation workshop¹ at IWEI 2011 (Stockholm) co-organised by COIN and I-VLAB.eu; in a second workshop, the Industry Special track in COOPIS 2011², the adopted methodology was submitted to the discussion to receive further validation.

The objective of this report is twofold:

- a. to identify possible interesting standardization activities that are related to COIN, and for which COIN could contribute, that include elements for new specifications but also contributions in terms of vision and requirements;
- b. to setup a methodology to master the complexity of the relationships between COIN's outcomes and current standardisation activities.

The idea, in short, is to move from a mono directional investigation (*how the project results could be standardized*) to a richer three directional evaluation:

- a. *potential of COIN outcomes for future standardization,*
- b. *potential of present standardization for COIN future developments and follow-up,*
- c. *potential interest for European standardization policies and priorities in terms of strategies and standard adoption fostering.*

The report is structured in three main parts:

- a. a general framework for identifying the main **drivers for interoperability standards**.

¹ “Standards ensuring enterprise interoperability and collaboration, the status of the art and perspectives”, in *Enterprise Interoperability, proceedings of the Workshops of the Third International IFIP Working Conference IWEI 2011*, Stockholm, March 22-24 2011, edited by iste Ltd and John Wiley & Sons Inc.2011 Ltd, UK, , ISBN 978-1-84821-317-3

² “Discovering potential synergies between research projects and standardisation, the COIN case”, Brutti A., De Sabbata P., Gessa N., Novelli C., Del Grosso E., COOPIS Industry Special Track, going to be published

Chapters 2 and 3 describe the landscape of the EU policies and priorities, the approach to standardisation of some of the most relevant FP7 research actors in Enterprise Interoperability and, finally, a description of the activities of some of the most relevant standardisation organisations with a specific focus on completed and ongoing activities of potential interest for COIN;

- b. the definition of a **methodology** (chapter 4) to structure the world of the COIN outcomes and investigate their relationships with standardisation in an effective non-dispersive approach despite the complexity and heterogeneity of COIN results;
- c. the result of the **application of this methodology** to COIN.

Chapter 5 aims to recollect with a fine granularity all the potential relationships and points of interest between COIN results and potential or current standardisation activities .

The definition of a new methodology was necessary to collect, analyse and frame all the potential implications between standardisation issues and COIN project outcomes.

The COPRAS (COoperation Platform for Research And Standards, <http://www.w3.org/2004/copras/>) project was considered as the main reference about facilitating the relationships between an IT research projects and standardisation. COPRAS produced a set of guidelines for the optimal management of the relationships with standardisation bodies.

Nevertheless COIN presents some peculiarities because of its dimension (a wide variety of outcomes), its time frame (not fitting the time scale of standardization initiatives), its 'visionary' course connected with the ideas of the future evolutions of the Internet, its request to consider bidirectional relationships with the standardization world.

For all of these reasons it was necessary to consider some additional requirements:

- *subdivide the domain of interest, to facilitate the reconciliation between project outcomes and standardization initiatives in the same sub-domain*
- *deal with skills of different people highly specialized*
- *consider the 'political' perspective (and priorities) of standardization world*
- *consider the relationships between the project and standardization as bidirectional*
- *implement different types of relationships between project and standardization.*

Besides the COPRAS guidelines it was necessary to establish additional methodological tools to manage the COIN complexity and discover unexplored relationships between project outcomes and standardisation with a reasonable effort.

The final conclusions (chapter 6) reflect the richness and variety of the project activities: different possible actions were considered for example sharing a vision or some requirements in order to gather an opportunity or submitting a technical contribution to an ongoing technical committee, or exploit some existing specifications in the project follow-up and exploitation.

2. A short briefing about COIN outcomes

2.1 COIN Vision

“By 2020 enterprise collaboration and interoperability services will become an invisible, pervasive and self-adaptive knowledge and business utility at disposal of the European networked enterprises from any industrial sector and domain in order to rapidly set-up, efficiently manage and effectively operate different forms of business collaborations, from the most traditional supply chains to the most advanced and dynamic business ecosystems.”³

Key Concepts:

Self-adaptive Knowledge, Business Utility, Business Collaborations, Supply Chain, Business Ecosystems

2.2 COIN Mission

The mission of the COIN IP (<http://www.coin-ip.eu>) is to study, design, develop and prototype an open, self-adaptive, generic ICT integrated solution to support the above 2020 vision, starting from notable existing research results in the field of Enterprise Interoperability (made available by the whole Enterprise Interoperability DG INFSO D4 Cluster and specifically by the projects ATHENA, INTEROP, ABILITIES, SATINE, TRUSTCOM) and Enterprise Collaboration (and made available by the projects ECOLEAD, DBE, E4 and ECOSPACE). In particular, a COIN business-pervasive open-source service platform will be able to expose, integrate, compose and mash-up in a secure and adaptive way existing and innovative to-be-developed Enterprise Interoperability and Enterprise Collaboration services, by applying intelligent maturity models, business rules and self-adaptive decision-support guidelines to guarantee the best combination of the needed services in dependence of the business context, as industrial sector and domain, size of the involved companies, openness and dynamics of collaboration.

This way, the Information Technology vision of Software as a Service (SaaS) will find its implementation in the field of interoperability among collaborative enterprises, supporting the various collaborative business forms, from supply chains to business ecosystems, and becoming for them like an utility, a commodity, the so-called Interoperability Service Utility (**ISU**). The COIN project will finally develop an original business model based on the SaaS-U (Software as a Service-Utility) paradigm where the open-source COIN service platform will be able to integrate both free-of-charge and chargeable, open and proprietary services depending on the case and business policies.

Key Concepts:

Enterprise Interoperability and Enterprise Collaboration (EI/EC), maturity models, business rules, self-adaptive decision-support, services, SaaS, ISU, SaaS-U, Supply Chain, Business Ecosystems

³ <http://www.coin-ip.eu>

2.3 The five main Scientific & Technology objectives for COIN

1. To design and develop a secure, pervasive and intelligent generic service platform (GSP) to host Baseline and Innovative COIN services for EI and EC and make them available under innovative on-demand, utility-oriented business models.
2. To consolidate and stabilize the ICT results of both EC and EI FP6 research into some EC/EI Baseline Services (free or charged; open-source or proprietary) and to make them available to Small and Medium Enterprises (SMEs) thanks to existing integrated collaborative platforms.
3. To further enlarge, extend and improve the Baseline Services, by developing other more Innovative Services in the EC and EI fields, which could take into account the most recent and promising technology challenges (e.g. Web 2.0, semantic web, space computing) and put them at service of EC and EI purposes.
4. To represent a pathway to convergence for EI and EC, by integrating under an innovative ecosystem of business models called SaaS-U (Software as a Service-Utility), the most prominent stakeholders involved in EI and EC.
5. To demonstrate, experiment, trial and assess the project results into 6 test cases in Aeronautics (Spain), Automotive (Slovenia), Aerospace (Italy), Pulp & Paper (Finland), Healthcare (U.K.) and ICT (Hungary), implementing different collaboration forms (supply chains, collaborative networks, business ecosystems) and expressing different interoperability needs (business and knowledge oriented).

Key Concepts:

Generic Service Platform (GSP), Enterprise Interoperability and Enterprise Collaboration (EI/EC), on-demand and utility-oriented business models, integrated collaborative platforms, SaaS-U (Software as a Service-Utility), Aeronautics, Automotive, Aerospace, Pulp & Paper, Healthcare, supply chains, collaborative networks, business ecosystems, knowledge-oriented

2.4 COIN Results⁴

- A. Enterprise Collaboration services
- B. Enterprise Interoperability services
- C. Generic Service Platform (GSP)
- D. SaaS-U and Business Models Research
- E. Enterprise Collaboration and Interoperability Maturity Models

For a detailed analysis of COIN outcomes see at Annex A of this document.

⁴ <http://www.coin-ip.eu/research/coin-results>

3. The drivers for the Interoperability Standards of the future

3.1 EU policies and standardisation

3.1.1 The Digital Agenda

The Digital Agenda for Europe⁵ is a flagship initiative of the Commission and its communication presently is one of the most relevant declarations of intent in the perspective of the development of the Future Internet and ICT investment of the Commission: it declares *“the overall aim of the Digital Agenda is to deliver sustainable economic and social benefits from a digital single market based on fast and ultra fast Internet and interoperable applications”*.

The starting point of the agenda is the identification of the **seven** most significant **obstacles** to the development of the **Virtuous cycle of the digital economy**; at least three of them directly or indirectly deal with the ICT technologies applied to the networks and the services they provide:

- Fragmented digital markets
- Lack of interoperability
- Rising cybercrime and risk of low trust in networks

The *“Fragmented Digital Market”* obstacle deals with normative and regulatory aspects but also with aspects related to the “application level” related to payments and invoicing as well as to cross-border telecom services.

The *“Lack of interoperability”* obstacle directly deals with the “Weaknesses in standard-setting, public procurement and coordination between public authorities prevent digital services and devices used by Europeans from working together as well as they should.”

Finally the *“Rising cybercrime and risk of low trust in networks”* obstacle deals with the necessity to setup a new quality of security and trust on the network, that has require the technological implementation of new policies and new security requirements though new services and standards.

The Digital Agenda in order to tackle the seven obstacles plans a plan of actions grouped by ‘pillars’⁶:

- *Digital Single Market*
- *Interoperability and Standards*
- *Trust and Security*
- *Very Fast Internet*
- *Research and Innovation*

⁵ *Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions, A Digital Agenda For Europe, Com(2010) 245final/2, 26.8.2010*

⁶ *Digital Agenda planned actions, Interoperability and Standards, actions 21-27, http://ec.europa.eu/information_society/newsroom/cf/pillar.cfm?pillar_id=44&pillar=Interoperability%20and%20Standards*

- *Enhancing e-skills*
- *ICT for Social Challenges*
- *International*

It is meaningful to outline that many of these actions have a clear and direct impact on the aspects of standardisation and interoperability; a non exhaustive list could be:

- completion of the SEPA (Single European Payment Area)
- revision of the eSignature directive and interoperability of secure eAuthentication systems
- EU-wide on-line Dispute Resolution system for eCommerce transactions
- online EU trustmarks for retail web sites
- new telecoms frameworks with regards to the protection of individuals' privacy and personal data
- consumer protection as well as fast reaction against to cyber attacks

On the other side, related to the '*Lack of interoperability*' obstacle is worth to observe that the proposed key actions (Pillar II) are related to the need for new rules on ICT standard implementation and better coordination between standardisation bodies in Europe, with a recommendation to the member states to implement the EIF (European Interoperability Framework for the public administrations) at national level by 2013:

- Action 21: Propose legislation on ICT interoperability
- Action 22: Promote standard-setting rules
- Action 23: Provide guidance on ICT standardisation and public procurement
- Action 24: Adopt a European Interoperability Strategy and Framework
- Action 25: Analyse the consequences of requesting significant market players to licence information
- Action 26: Member States to implement European Interoperability Framework
- Action 27: Member States to implement Malmö and Granada declarations

Finally the Agenda expects that "industry is increasingly in need of open and interoperable solutions to exploit ICT across all sectors". Thus "Industry-led initiatives aiming at **standards and open platforms for new products and services** will be supported in EU-funded programmes".

From the COIN point of view this position might open a perspective in terms of potential support for the creation and development in a sustainable way of a new generation of real ISU services.

Thus the Commission intends to "Work with stakeholders to develop a new generation of web-based applications and services, including for multilingual content and services, by supporting standards and open platforms through EU-funded programmes", while member states should engage large scale pilots to "to test and develop innovative and interoperable solutions in areas of public interest that are financed by the CIP".

Other **domain related actions** deal with interoperability in eHealth and Smart Energy Grids, and with cross-border eProcurement, eGovernment and eEnvironment services.

3.1.2 EU Manufacturing industry according to the High Level Conference on Industrial Competitiveness

From the report⁷: “First tentative findings of a sector-specific analysis carried out in DG Enterprise and Industry” is a first outcome from the efforts of DG Enterprise to react on time to upcoming challenges to the competitiveness of the main industrial sectors. Although not an official Commission publication the aim of the paper is “to provide a basis for discussion and development of the industrial policy initiatives that will be put forward as a “new industrial policy” in the context of Europe 2020”.

This document puts in evidence some topics that, indirectly, demand for ICT like energy efficiency, internal energy market, data management for health and internationalisation of the supply chains, business related services, subcontracting as a ‘SME dimension’; in short ICT is depicted as a manufacturing sector itself or as a Key Enabling Technology (KET) for the manufacturing industry; the Future Internet related issues are not addressed as well as no specific drivers are evidenced for the ICT development and standardisation.

3.1.3 The Future European standardisation

In the period between 2009 and 2011 EC has been very focused on the issue of the revision of the European Standardisation System (ESS)⁸ from a top level and strategic point of view as it is considered an “element in the delivery of the single European market”. As a result a certain number of documents and positions have been delivered.

Presently the ESS is based on CEN, CENELEC and ETSI with a number of national standards bodies or committees that relate to these three European bodies.

More in detail CEN provides standards for most goods, systems and services. CENELEC provides standards in the electro-technical field, while ETSI is specialised in providing standards in the field of electronic communications and ICT.

It is to be observed that CEN too has a lot of activities related with the ICT side of goods and services (from invoicing to the CyberIdentity and sectorial data exchange specifications, for example); on the other side ETSI has a strong know-how on the communication sector, including the issues related to their interoperability testing.

A brief analysis of the standardisation policies, with the lens of ICT and services, is in the next paragraphs.

⁷ “EU Manufacturing Industry: What are the Challenges and Opportunities for the Coming Years?”, 2nd High Level Conference on Industrial Competitiveness, Brussels, 26 April 2010

⁸ “REPORT on the future of European standardisation”,(2010/2051(INI)), European Parliament, A7-0276/2010,

3.1.3.1 The report of the expert panel for the review of the European standardisation system

The Expert Panel for the Review of the European Standardization System (EXPRESS) was established as an independent group, by the European Commission in January 2009 to review the entire ESS. Its report, delivered on February 2010,⁹ closely relates the European Standardisation System (ESS) activities to the delivery of the single European market construction through the use of Directives in key areas.

The influence of Europe in international standardisation is considered as a factor enhancing European competitive position in the world; nevertheless there is a shift of the position from the traditional objective to produce standards for its internal need to the new objective to be a beacon for the rest of the world and thus to influence more 'aggressively' international standardisation.

Within this vision the "ESS will be an effective centre of influence ensuring market relevance, avoidance of duplication and a proven added value of standardization"¹⁰.

New strategic challenges are identified for 2020 in relationship with standardisation: globalisation, convergence of technologies, climate change and energy management for example.

On this purpose the proposed approach is "to develop and enhance best practice in all of these areas, there will be continued pressures on the ESS to work more efficiently and to deliver smarter quality standards solutions to market in a timely manner".

Among a certain number of recommendations the panel suggests to:

- *Take care about standards related to the 'service sector'*
- *Provide easier access to standards and standardization for SMEs*
- *Build relationships between researchers and innovators and the ESS*

The vision proposed by the panel is to have from the ESS a major contribution to Europe's innovation and sustainable development in support of Europe's competitiveness, and the welfare of its citizens (by facilitating improved management, transparency and a stronger ethical approach, resulting in better risk management and business continuity).

Within this framework, among the others "DRIVERS", it is worth to mention:

- *SMEs, as a key element of the European economy, should benefit from the use of SME-friendly standards;*
- *Reduction of time to market, with standards providing tools for take up and inter-operability;*
- *compatibility of standardization with customization;*
- *optimization of the life-cycle of products;*
- *increase of energy efficiency and energy use management.*

More specifically about **innovation** and the role of standards in innovation the report asserts "*The role standards play is different at the different stages of the innovation lifecycle:*

⁹ "Standardization for a competitive and innovative Europe: a vision for 2020", The expert panel for the review of the European standardisation system (EXPRESS), February 2010

¹⁰ *ibidem*

- **Standardization converts new knowledge from scientific research into market in the following areas:**
 - *nomenclature/terminology and metrology*
 - *measurement and test methods for reliability, quality and safety*
 - *conversion in products, processes and systems*
 - *interoperability*...”

Regarding standardization of services the report points out that “standards for services are expected to give momentum to the European single market”¹¹ with an emphasis on “networked services” (water, energy, telecoms, transportations, postal services) where the focus is on management systems standards¹² rather than –albeit not excluding– ICT related aspects: “*Strategic Goal 6: To promote and use standards in order to further support internal and external markets, especially for the quality and safety of services provided by the market, including business-to-business, business-to-consumer and networked services and in support of the growth and competitiveness of the services sector*”¹³.

The ICT related aspects for business services standardization are recalled by the “Key areas for public and societal policy objectives” where there is a statement about “Open access to products, services and information for all people without specific, single-vendor platform or application requirements”.

From a general point of view the ESOs (European Standardisation Organisations) are expected to a) better coordinate their policies, b) deploy more active policies¹⁴ and c) improve stakeholders’ participation.

According to this guidelines, the European Commission is expected to “regularly consult with the ESOs and all other stakeholders, to identify potential areas where there is a need for action and where no initiatives have been taken either within the ESOs or globally, to consider standards that could act as influential demonstrators in the field of e.g. services, public procurement.”

Regarding standards developments systems three statements have to be mentioned:

- “the perception that standardization is slow is no longer correct. Informal standards, and increasingly formal standards, may be produced in only a few months depending on the urgency and needs of the stakeholders.”
- there is need to increase “the application of, user-friendly, electronic working methods in standards development and wider public consultation in particular. This will require harmonization of processes and working tools among the three ESOs and NSBs, and the international standards organizations”.
- the ISO Code of Ethics¹⁵ has to be followed “to ensure that the impartiality of standards organizations is not endangered by revenues from other activities, such as certification or accreditation”.

¹¹ See also the study requested by European Parliament “New Professional and Business Related Services: Status and Prospects, PE 404.891”

¹² CHESSS - CEN's Horizontal European Service Standardization Strategy, <http://www.cen.eu/cenorm/services/business/value/chesss/chesss.asp>

¹³ *ibidem*

¹⁴ For example according to the process proposed by FLES “CEN and CENELEC in the Future Landscape of European Standardization” <http://www.cen.eu/cen/NTS/Standardization/Pages/default.aspx>, programme to identify future challenges and opportunities for European standardization, May 2007

3.1.3.2 European initiatives on 'Better standards to boost European competitiveness' on June 2011

On June 2011 the European Commission has assumed the initiative for "Better standards to boost European competitiveness and promote consumers' interest"¹⁶ as a strategic change in its standardisation approach as a conclusion of the process of review of the related policies.

The proposal for a regulation of the European Parliament and of the Council on European Standardisation¹⁷, has finally recognised the role of standards elaborated by organisations that are not ESOs or international Standardisation bodies, like W3C, by recognizing that "in the field of ICT, many standards ensuring interoperability are not elaborated by the ESOs but by other organisations that develop standards (hereinafter "global fora and consortia")" and "so currently a major part of the global ICT standardization work is done outside the formal European or International standardisation system".

A concrete proposal is that "the use of standards developed by other organisations in the field of information and communication technologies will be possible in public procurement, provided that these standards comply with a set of criteria based on the WTO principles for international standardisation processes¹⁸, in domains where there are no European standards, where European standards have not gained market uptake or where these standards have become obsolete".

And, again, a specific attention is related to standards for services (in a wide sense).

The document "A strategic vision for European standards: Moving forward to enhance and accelerate the sustainable growth of the European economy by 2020"¹⁹ asserts that

- "European standards replace national and often conflicting standards which, as such, may create technical impediments to a national market. Many European standards are developed by the ESOs at the request of the Commission. A large proportion of these standards adopted by the ESOs at the request of the Commission are so-called "harmonised standards"²⁰ which ensure that products meet the essential requirements set out in EU harmonization legislation".
- "European and other standards are indispensable in the digital society to ensure the interoperability of networks and systems, especially in the field of ICT. In a digitally driven society, ICT solutions are used in any economic sector as well as in our daily lives. ICT solutions, applications and services have to be able to communicate with each other; they should be interoperable.
Interoperability requires standards."

¹⁵ ISO Code of Ethics http://www.iso.org/iso/codeethics_2004-en.pdf

¹⁶ <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/11/668&format=HTML&aged=0&language=EN&guiLanguage=en>

¹⁷ EC COM (2011) 315 final, 1-6-2011, http://ec.europa.eu/enterprise/policies/european-standards/standardisation-policy/index_en.htm

¹⁸ "European Policy Principles on International Standardisation", SEC(2001) 1296 and WTO/G/TBT/9 of 10 November 2000, and Annex 4

¹⁹ EC COM (2011) 311 final, 1-6-2011

²⁰ According to the "New Approach", defined in a Council Resolution of May 1985, European Commission directives define the "essential requirements", e.g., protection of health and safety that goods must meet when they are placed on the market. The corresponding technical specifications meeting the essential requirements of the directives are referred to as "harmonised standards". <http://ec.europa.eu/enterprise/policies/european-standards/documents/harmonised-standards-legislation/>

And, again there is an expectation on the areas where Europe is the driving innovation force in developing new types of tradable goods, services and technologies – for example in areas such as electric vehicles, security, energy efficiency and smart grids that the creation of the European standard be carried out rapidly with the aim of asserting it as an international standard.

An idea of a more strategic use of standards is confirmed when the document declares that “the strategic use of standards on the one hand and European standardisation on the other, are strategic assets for securing EU competitiveness and a key tool for knowledge dissemination, interoperability, validation of novel ideas and promotion of innovation”.

One of the strategic objectives is dedicated to ICT standards with a strong focus on interoperability between services and applications: “Standards need to be quickly available – especially but not only – to assure the interoperability between services and applications in the field of information and communications technologies so that Europe can reap the full benefits of ICT.”

In particular a specific request is in place for “development of voluntary standards for the service sector which are market driven, consensus-based and take into account the public interest”.

3.1.3.3 European ICT Standardisation workplan 2010-2013

The concrete support of the EC to the standardization activities in ICT is regulated by the ICT Standardisation Workplan that is published and updated yearly and that is expected to be implemented by the ESOs with the EC support; the last update has been delivered on January 2011²¹.

The following priority domains have been identified in the workplan (in evidence some of the most relevant actions for each of the priorities):

- eHealth (interoperability testing and semantic interoperability standardization)
- Regulated medicinal products
- eInclusion (Interoperability for smart homes/independent living/accessibility and related service)
- Intelligent Transport
- RFID
- eSignatures
- eInvoicing
- eSkills and eLearning
- ICT for sustainable growth (efficient energy use ICT networks, new standards for smart energy grids)
- Internet of Things (architectures for utility meters)
- ePublishing
- electronic Identity Management and privacy (interoperable electronic identity management, Data protection and privacy in ambient intelligent environments)
- Industrial control security (related to SCADA systems)

²¹ 2010-2013 ICT Standardisation Work Programme for industrial innovation, 1st update - January 2011, http://ec.europa.eu/enterprise/sectors/ict/files/ict-policies/2010-2013_ict_standardisation_work_programme_1st_update_en.pdf

- eBusiness (eProcurement, XBRL, digital global supply chains, classification of goods, business registries)
- eGovernment
- Emergency Communications (Location Enhanced Emergency Call Service)
- Digital content (cinema heritage, digital cinema)
- Support to implementation of standards (awareness and interoperability testing)

3.1.4 A final comment on policies and related opportunities for COIN

From the ICT interoperability perspective the most relevant aspects in the 2020 perspective enforced by the Digital Agenda and by the new vision of the standardisation policies could be summarised in:

- the previous approach to standardisation based on the development of standards for its internal needs is discontinued by the EC that aims to play at the International level
- standards are considered as a part of the European 2020 strategy to boost enterprise competitiveness, with an emphasis on ICT standards
- the EC, in this perspective, aims to improve its participation to international standardisation activities and, in parallel, to take advantage by the results of International standardisation, especially in ICT (for example by recognizing consortia, like W3C, attended they respect principles of openness and transparency)
- the EC will increase its support to the creation and adoption of European 'harmonised standards', new standards that allow to overcome conflicts between existing specifications – for example originated by different countries – in a market driven perspective
- the procedures and the activities of ESOs will have to be reviewed in order to speed up the standardisation processes and, tools in such processes, the adoption of ICT will be encouraged/required
- standards are required to address increasingly both the societal challenges and the market needs:
 - standards related to business services (in the wider sense: from regulation and management towards accessibility and IT communications) are a new priority
 - international standards are expected to take a major role in European public procurement
 - standards are expected to continue to have a priority for all the infrastructures (intelligent transport, cyber identity, etc)
 - standards will have to contribute to the technological development in some key domains for societal sustainability in a wide sense (e-Health and domotics, energy efficiency and smart energy grids, environmental monitoring and carbon footprint reduction)

Mobilisation of resources is expected to implement this new policy for standardisation from EC (and ESOs) as well as from the member states and to influence the next releases of the 2010-2013 ICT Standardisation Workprogram since 2012.

At a first approach it is reasonable to expect that the present outcomes of COIN, and mainly their future developments, could be influenced by this political framework on standardisation and interoperability in relation to:

- an increasing interest in business service enablers and standards

- increasing support to tools and demonstrators for interoperability
- request for collaboration platforms in the standard building processes and in diffusion and adoption activities

On the other side there is no evidence of an explicit demand for ISU provision; nevertheless the new framework could represent a more favourable scenario with opportunities for their development, especially in case of mobilisation of national resources to tackle the ambitious objectives of the Digital Agenda.

3.2 The research approach to standardisation

3.2.1 Future Internet Assembly (FIA)

The European Future Internet Assembly (FIA) is a collaboration initiative among projects to strengthen European activities on the Future Internet with the objective of maintaining European competitiveness in the global marketplace: FIA brings together around 150 research projects that are part of Challenge 1 of the ICT programme of FP7²².

The research areas declared as of main interest for the FIA are:

- The network of the future
- Cloud Computing, Internet of Services and Advanced Software Engineering
- Internet-connected objects
- Trustworthy ICT
- Networked Media and Search Systems
- Socio-economic considerations for the Future Internet
- Application domains for the Future Internet
- Future Internet Research and Experimentation (FIRE)

3.2.1.1 The approach to standardization

Among these FIA key activities “Developing Future Internet systems, technologies and architectures through working groups and projects, possibly leading to contributions to standards” has a relevant position: activities are structured by working groups (12, presently) one of them is addressing (pre-) standardization²³: established in 2010 the group does not aim to lead “standardization on its own but will support other projects, to engage in standardization, to get more out of their standardization activities and to ensure sustainability of their efforts after project end”.

It is reasonable to expect that some of the pre-standardization initiatives could lead to the development of real standards in near future if they demonstrate their viability and will meet concrete market interest.

²² <http://www.future-internet.eu/>

²³ http://fisa.future-internet.eu/index.php/FIA_Standardisation_Support

3.2.1.2 The domains of major interest

The domains covered by the group (July 2011) are: testing, mobility, security, cloud computing, Internet of things, Internet of services and media²⁴. On the web there is a collection of pre-standardization issues promoted by different projects in collaboration with standardization bodies:

- Internet of things, some projects are collaborating with ETSI that is implementing the M2M architecture for (smart) device connection, with use cases in eHealth, Connected Consumers, City Automation, Automotive applications.
- Mobile Internet, activities related to Near Field Communication (NFC) Mobile applications are from projects in relationships with ETSI
- Media and content, 3d gaming and TV related applications are from projects in collaboration with ETSI
- Testing, testing languages (TTCN3, UML Testing profile, TCL, others) and modeling languages are under investigation with the support of ETSI, OMG, ITU-T and others.
- Trust, security and privacy, running activities on RFID (mandate MI/436) and a stopped activity for a specification under development (EN 387 018) on enhanced privacy & security protection on Next Generation Networking (NGN)²⁵ with the involvement of ETSI, CEN, CENELEC, etc
- Grids and cloud computing initiatives on standardization Requirements for Cloud Services, Specialist Task Force on ICT GRID Technologies Interoperability and Standardization, Grid Component Model managed by projects and ETSI;
- Software, services and virtualisation service choreography (BPMN 2 revision, UML profiles for BPMN processes), cloud management (standards for cloud access, storage, interoperability), testing languages (UML2 testing profile with SOA and Cloud), service modeling (SoaML, PIM4Cloud, Mashup description language, widgets)

3.2.1.3 A short evaluation from the COIN perspective

The reported standardization initiatives appear at different level of concrete development, some at a very early stage of investigation, others with a defined mandate to standardization bodies. According to its mandate the working group has produced a wide collection of references to existing activities, reports and discussions on the issues related to standardization and Future Internet: it appears that a wide amount of current efforts are dedicated on one side to the infrastructure of the future networks (with an high attention to the problems related to the lower levels of the interoperability stack) and, in parallel to establish better and more efficient relationships between standardization bodies and research.

3.2.2 FP7 clusters: FInES cluster and other initiatives

The Future Internet Enterprise Systems (FInES)²⁶ aims to enable enterprises, including SMEs, by means of ICT, to exploit the full potential of the Future Internet. The FInES vision and research objectives are defined

²⁴ http://fisa.future-internet.eu/index.php/Pre-standardisation_activities_in_FIA

²⁵ A Next generation network (NGN) is a packet-based network which can provide services including Telecommunication Services and able to make use of multiple broadband, Quality of Service-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. It offers unrestricted access by users to different service providers. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users (ITU-T definition)

²⁶ <http://www.fines-cluster.eu>

in its Position Paper²⁷. stating that *“The full potential of the Future Internet is accessible to, relevant for, and put to use by European enterprises including SMEs.*

The objective of the FInES Cluster is to grasp the scenarios of Future Enterprises opening up new research perspectives. It is uniting the previous Enterprise Interoperability and Collaboration (EI) and Digital Ecosystems (DE) clusters, in order to encompass the past and current research experts and organisations focusing on an increased opportunity for synergy and enhanced collaboration among research projects in this unit.²⁸

At present, the FInES cluster involves around 20 research projects from FP7 including the COIN project.²⁹ The cluster has launched 13 Taskforces, one being the Standardisation Task Force.

3.2.2.1 The approach to standardization

The FInES_Standardisation Task Force aims to establish a base for standardisation requirements, in particular:

- to identify opportunities, potential barriers and concerns on interoperability;
- to establish contacts with standardisation groups (CEN, IFIP, W3C, OASIS and others) and initiatives working in the area of interoperability as I-Vlab;
- to derive a synthesis of relevant RTD work addressing existing standards, as well as ongoing work in standardisation and to identify areas that should be standardised in the future;
- to advocate a common vision and methodology on the research-standardisation relation, starting from the COPRAS³⁰ work.

Further, this task force will support adoption and dissemination of standards to be promoted at multiple levels, in order to enable collaboration and cooperation of multiple systems in the Future Internet.

One of the main activities of the Task Force has been the production of a report³¹ about standardisation in relationship with the activities and interests of the research projects that are represented in the FINES cluster.

3.2.2.2 The domains of major interest

The FInES Standardisation Task Force Report (current draft version³²) has examined the correspondence between research in the area of the Future Internet and Standardisation delivering the following outcomes and recommendations.

The report focuses on:

- Cloud Computing
- IOT standardisation in relationship with GS1 activities
- Semantic Interoperability of Business Documents

²⁷ FInES Position Paper, Final Version (Version 3.0), 1 September 2009

²⁸ http://cordis.europa.eu/fp7/ict/enet/ei_en.html

²⁹ FInES state of play, Cristina Martinez, FInES Cluster meeting April 1st, 2011,

³⁰ Standardization guidelines for ICT projects interfacing with ICT standards organizations, The COPRAS Consortium, January 2007

³¹ FInES Standardisation Task Force Report, Draft for Comment, 6/4/2010, <http://cordis.europa.eu/fp7/ict/enet/documents/task-forces/standardisation/fines-standards-report-draftforcomments.pdf>

³² *ibidem*

- Requirements for Enterprise Interoperability addressing B2C, B2M, M2M areas
- Conformance and Interoperability Testing

The report has looked in depth at the opportunities afforded by Cloud Computing and covers the many initiatives and organizations active in this area and the ramifications of these technologies and initiatives to the Future Internet. The report has looked at the Global Standards One (GS1) work in relation to the Internet of things and has shown that many of the methods used under GSI are transferable to solutions in the Future Internet.

The report covers Semantic Interoperability of Business Documents and explores the extension of this for realizing Software as a Service Utility and how this could lead onward to the Internet Service Utility (ISU).

Enterprise interoperability (EI) concepts as defined in EI frameworks cover the B2C, B2M and M2M areas as well as B2B and address applications and services. The report recommends actions to coordinate work in the Future Internet and the more general case of Interoperability Standardisation, conformance and certification.

An enhanced version of the Standards and Standardisation TF report focusing on terminology, methodologies for research-standardisation relationship and orientation along the FInES Research Roadmap is in preparation, with a foreseen completion at YE 2011.

3.2.2.3 A short evaluation from the COIN perspective

The approach of the FINES cluster confirms the high relevance of CLOUD Computing for standardisation that is a keyword of the COIN activities, especially for the GSP platform, and puts in some evidence running initiatives that seems to be promising: CCIF³³, OMG, VMWARE, OCC³⁴, OGF³⁵, NIST, SLA Service Level Agreement (i.e.WSLA-ibm, SLA@SOI-fp7prj, WS-Agreement-ogf).

In parallel it identifies running initiatives dealing with Semantic Interoperability (i.e. OASIS SET TC) that can deal with the top level EC services supported by the platform.

Its focus for standardisation could be summarised as follows:

- Emerging Technology contexts: CLOUD and IOT
- Fields for Application: ISU, IOT (of Future Internet)
- Need for functionalities: Semantic Interoperability of Business Documents (for SaaS-U), Certification and Conformance for services and products, Service Level Agreement (i.e.WSLA-ibm, SLA@SOI-fp7prj, WS-Agreement-ogf)

Furthermore the report seems to suggest a future direction of better co-ordination between EI (namely B2B) and M2M and B2M and this should suggest to better investigate the potential of COIN outcomes towards running initiatives like M2M launched by ETSI.

³³ <http://www.cloudforum.org>, no activities appear after April 2010

³⁴ <http://opencloudconsortium.org/working-groups/>, active (May 2011), Working Group on Open Cloud Testbed, standardization activities not running.

³⁵ <http://www.gridforum.org/>, active. with the Open Cloud Computing Interface specifications

3.2.2.4 Other FP7 initiatives approaching standardization

3.2.2.4.1 SOFI project: Service Offering for the Future Internet³⁶

SOFI is a project in the area of Internet of Services, Software and Virtualisation (Objective 1.2); its partners are STI International (Austria), The Open University (UK), Engineering – Ingegneria Informatica Spa (Italy).

The project declares to complement EU R&D projects in the area of Internet of Services, Software and Virtualisation (Objective 1.2) through specific support activities.

They assume three main objectives :

- **Support the organisation of the Future Internet Assembly**, and in particular to pursue the activities of and further develop the Future Internet Service Offer.
- **Support dissemination of the Internet of Services community results** as a crucial instrument to strengthen and extend the impact of supported collaborative research projects through the provision of specific dissemination channels, in particular the conference series Future Internet Symposium (FIS) and ServiceWave.
- **Implement the Future Internet portal** and collaboration measures to ensure cohesion and alignment of strategies, objectives and results of projects and initiatives within the Future Internet initiative.

Among its declared activities there is a line regarding **standardisation**: “A co-ordinated effort to define the Future Internet of Services requires also to be built upon the development of standards, which can ensure interoperability of software and uptake by industry. SOFI will support individual standardization and pre-standardization efforts within the Services domain, with a view to alignment of different activities as well as seeking a holistic approach which fits the Future Internet as a whole”.

More in detail they assume the following references:

- NEXOF D9.2b report on standardisation activities
- Shape SOAMLstandard for service modelling (adepte by OMG march 2010)
- SOA4ALL WSMO-Lite submission to W3C

Their position gives evidence to two running initiatives:

- “USDL: Unified Service Description Language”³⁷

An incubator activity at W3C (see W3C paragraph), the target is a language “for describing general and generic parts of technical and business services to allow services to become tradable and consumable”.

It is proposed as a “master data model for services to describe various types of services ranging from professional to electronic services. It aims at a holistic service description putting a special focus on business aspects such as ownership and provisioning, release stages in a service network, composition and bundling, pricing and legal aspects among others, in addition to technical aspects.” Contributors: SAP, Fraunhofer FOKUS Institute

- RESTFUL services: SA-REST: Semantic Annotation of Web Resources³⁸

³⁶ <http://www.sofi-project.eu/>

³⁷ <http://www.w3.org/2005/Incubator/usdl/>

³⁸ <http://www.w3.org/Submission/SA-REST/>

Submitted to W3C on April 2010, “SA-REST is a poshformat to add additional meta-data to (but not limited to) REST API descriptions in HTML or XHTML. Meta-data from various models such an ontology, taxonomy or a tag cloud can be embedded into the documents. This embedded meta-data permits various enhancements, such as improve search, facilitate data mediation and easier integration of services.”

Both the initiatives appear of some interest for future COIN developments and applications.

3.2.2.4.2 Internet of Services projects

Internet of Services organised a Collaboration meeting for FP6 & FP7 projects with a Working group on Standards³⁹ (at the meeting of October 19th 2010).

It aimed to be the forum for standards-related issues within European Service and Software Architectures, Infrastructures and Engineering project landscape.

The purpose of that Standards Collaboration session was to create awareness between :

- to inform and educate projects starting in 2010 regarding standardisation
- to discuss the projects to find common ground.

During the meeting the presentations of 4 projects were discussed:

- IRMOS Standardisation
- mOSAIC - Open-Source API and Platform for Multiple Clouds
- RESERVOIR - Resources and Services Virtualization without Barriers
- SLA@SOI - Standardisation

The projects expressed interest in some running activities related to cloud, for example ETSI CLOUD TC (contribution in terms of gap, use cases, etc from IRMOS project and Open Grid Forum with its OCCI-Open Cloud Computing Interface (SLA@SOI, RESERVOIR projects).

Two open problems were reported:

- problems between standardisation and project cycle in order to align the time scheduling of the different activities.
- difficulties to guarantee an effective standardisation effort after the end of the project

³⁹ http://ec.europa.eu/information_society/events/cf/ios10/item-display.cfm?id=5139

3.2.3 Networked European Software and Services Initiative (NESSI)

Nessi⁴⁰ is an European Technology Platform, launched in 2005. The goal is to support a common long term strategy on software and services to "contribute to Europe's competitiveness, job sustainability and quality of life".

NESSI is a community of over 430 organisations from industry and academia, their aim is to achieve an impact in the Internet of Services through contributions to standards, open source as well as commercial projects.

The core of the NESSI strategy are NESSI SRA (Strategic Research Agenda, continuously updated) and NEXOF, the NESSI Open Integration Services Framework, "a coherent and consistent open service framework leveraging research in the area of service-based systems to consolidate and trigger innovation in service-oriented economies"⁴¹.

Since 2011 NESSI is evolving towards the NESSI Open Innovation Environment.

3.2.3.1 The approach to standardization

In the framework of NESSI a workgroup has been launched to tackle the challenge of the open standards necessary to build the NEXOF.

In the NESSI position "standardisation and the use of Open Standards are of high relevance for the realisation of the objectives and work plan of the European Technology Platform (ETP) NESSI. Most notably the NESSI Open Framework (NEXOF) will rely on the implementation of Open Standards. Based on broad participation and the availability of Open Standards, NESSI should create opportunities for enabling the transformation of European environment through the development of an open services ecosystem".

As a first step it defined the NESSI position for standardisation policies and assumed the **Open Standards** as the basis of the NEXOF because, in the vision of NESSI, they

- build a foundation of NESSI and its Strategic Research Agenda
- contribute to the overall interoperability service-based applications
- make the Internet of Services happen
- enable wide adoption of NESSI technologies without creating barriers

Secondly they identified the relationships between NESSI Reference Architecture and standardisation that are widely describe in the **2nd Report on Standardisation Activities**⁴².

A survey was conducted involving running research projects⁴³ connected with NESSI and the workgroup released a final report of activities, whose main outcomes were:

⁴⁰ <http://www.nessi-europe.eu>

⁴¹ *ibidem*

⁴² *NEXOF-Reference Architecture , DeliverableD9.2b , 2nd Report on Standardisation Activities, Franz Kudorfer, Siemens AG, Gabriele Giunta, Engineering, Elmar Husmann, IBM, Mike Fisher, BT (30/06/2010)*

⁴³ *COMPAS, MASTER, SOA4ALL, SLA@SOI, RESERVOIR, PRIMELIFE, SHAPE, mymobileweb*

- the relationships between NEXOF patterns and related state of art standards
- the contribution from NESSI projects to upcoming standards
- a catalogue⁴⁴ of all the standards that are mentioned by the NEXOF Reference Architecture.

3.2.3.2 The domains of major interest

From the above mentioned report it emerges that the main fields in standardisation activities where the NESSI related projects gave a contribution (in collaboration with W3C, OGF and DMTF) could be summarised in:

- 1. Cloud Computing
- 2. Service Level Agreements & Negotiation.
- 3. Mobile Services
- 4. Service Compliance Management
- 5. Lightweight Service Modelling
- 6. Secure Service Access
- 7. Identity Management and Privacy

3.2.3.3 A short evaluation from the COIN perspective

The analysis of the relationships between NESSI patterns and state of art standards put in evidence, among the others, that the patterns *“cloudified application servers”*, *“federated distributed service bus”*, *“platform as a service”*, *“semantic based federated registries”*, *“mashup as a service”*, *“Internet of services”*, *“data mediation”* lack, at the moment, of standardised specifications.

It is reasonable to suppose that in these fields a contribution from the COIN project activities could result highly positive and obtain an high impact.

⁴⁴ <http://www.nexof-ra.eu/?q=node/529>

3.3 Standardisation bodies activities

In this report only some relevant standardisation bodies have been examined as the most potentially promising ones in the perspective of COIN and as representative of the variety of actors dealing with interoperability standards: other ones could result relevant, although not considered in this report, nevertheless it was necessary have a reasonable balance between the necessary efforts and the benefit of a wider investigation.

3.3.1 European Committee for Standardization (CEN)

CEN, the European Committee for Standardization (Comité Européen de Normalisation, Europäisches Komitee für Normung) provides a platform for the development of European Standards⁴⁵ (ENs) and other consensus documents.

It declares⁴⁶ to be “the only recognized European organization according to Directive 98/34/EC for the planning, drafting and adoption of European Standards in all areas of economic activity with the exception of electrotechnology (CENELEC) and telecommunication (ETSI)”. CEN, CENELEC and ETSI are the so called “European Standardisation Organisations” (ESOs).

CEN has **31 National Members** – the National Standardization Bodies (NSBs) of the EU and EFTA countries – and is active in a large number of **sectors** to help build the European internal market in goods and services, removing barriers to trade and strengthening Europe's position in the global economy. The **European Commission** and the **EFTA (European Free Trade Association) Secretariat** act as CEN's Counsellors in terms of regulatory or public interest.

CEN works in decentralized way: its members operate the technical groups that draw up the standards; the CEN-CENELEC Management Centre (CCMC) in Brussels manages and coordinates this system.

Until now CEN has been the core of European standardisation activities and European traditions in standards-making could be summarised as follows⁴⁷ :

- Backed by EU legal provisions (Directive 98/34)
- Ensuring a level playing-field (the single market)
- Societally inclusive

CEN has activities on many sectors, ICT is one of them.

All three European bodies (ESOs) have been active in ICT: with, in general, ETSI handling “infrastructure” issues and electronic communication aspects, while CEN and CENELEC are handling the application aspects and their aspects with “traditional” standards areas.

⁴⁵ *European Standards (ENs): these standards have a unique status since they also are national standards in each of its 31 Member countries.*

⁴⁶ <http://www.cen.eu>

⁴⁷ *Communication of John Ketchel, Innovation CEN-CENELEC, at Ghent Conference 15/12/2010*

CEN runs its activities through:

- **Technical Committees** producing traditional standards, made up of delegations representing CEN National members.
- **Workshops** producing CEN Workshop Agreements (CWA), open to all interested parties
- open **Focus Groups**, running pre-standardization work and public consultations.

3.3.1.1 Vision for the future

Since 2010 CEN is implementing its “new 2010-2013 strategy”⁴⁸: better connection between standardisation bodies and stakeholders (in ICT it means collaboration with ‘industry driven consortia’) and new drivers (economic, political, environmental, societal technological) are added to the traditional ones (like supporting single market creation), for example, among the others:

- need to better integrate SMEs in standardisation process.
- capitalisation of the knowledge economy
- support to the growth of the European services market.
- reduce the time to market of new technologies and services, with standards providing tools for take up and inter-operability.

Some initiatives in ICT sector are thought as good examples of such new approach:

- Global Interoperable eBusiness Test Beds (collaborative with US (NIST) and Korea)
- European electronic health insurance cards
- eInvoicing in Europe (a major activity to facilitate business adoption of global standards)

New areas are coming to the attention of standardisation bodies, like eBusiness, eHealth, eLearning, Intelligent Transport Systems, energy (thus RFID, smart meters, smart [electricity] grids...) where will be necessary to obtain interoperability and avoid fragmentation.

The future approach could foresee that technology driven consortia develop new specifications and CEN and other ESOs make them in an interoperable manner⁴⁹.

3.3.1.2 Ongoing initiatives

The ICT sector highlights activities on ICT in the electrotechnology field, eBusiness, electronic signatures, eLearning, RFID, eSkills, geographic information, Smart grids, SmartHouse, Smart metering.

Technical Committees, Workshops, open Focus Groups are currently active in the following main ICT areas:

- Banking software - XFS and J/XFS
- eAccessibility and Design for All
- eBusiness – General online Invoicing and Procurement issues or sector-specific initiatives reaching consensus in areas such as construction or textiles.
- eHealth – healthcare informatics. New activities in this domain are under review.

⁴⁸ CEN Strategy 2010-2013, ftp://ftp.cen.eu/CEN/AboutUs/Publications/Strategy2011_2013.pdf

⁴⁹ Communication of John Ketchel, Innovation CEN-CENELEC, at Ghent Conference 15/12/2010

- eLearning – for both academic and workplace environments.
- Intelligent Transport – road and traffic telematics, including e-safety, electronic fee collection.
- eGovernment
- Security, trust and data protection
- Cultural Diversity
- RFID

3.3.1.3 Interesting issues for COIN

Numerous Technical Committees are operating within CEN today, eleven have work programmes in the ICT (Information and Communication Technologies) sector (see Annex B). The Workshops are 14.

Most of them could be of any interest if and when COIN outcomes are concretely applied on specific domains, for examples services related to logistic or data protection or eBusiness.

A potential future area could be in the field of the relationships between 'federated services platforms' that need to find a technical specification for the interoperability requirements but, also, the setting up of legal, business and organisational reference framework for their future activities in order to foster their creation and federation. CEN, being in the hearth of the European standardisation, including non technology driven fields, could be the best partner in launching a complex and articulated standardisation initiative.

3.3.2 ETSI

The European Telecommunications Standards Institute (ETSI) is a recognised European Standards Organization and “produces globally-applicable standards for Information and Communications Technologies (ICT), including fixed, mobile, radio, converged, broadcast and Internet technologies”⁵⁰.

ETSI is a not-for-profit organization, initially founded to serve European needs and actually with more than 700 ETSI member organizations drawn from 62 countries across 5 continents world-wide. Thus ETSI results as a “formally recognized as a European Standards Organization, with a global perspective”.

The strategic areas of ETSI activities are:

- Global Standards Producer - 'to provide standards for telecommunications and electronic communications networks & related services for the global market place...'
- European Standards Organization (ESO) - 'to provide ICT standards for the European market place...'
- Service Providing Organization - 'to provide services in the area of Interoperability testing, Fora hosting and development of protocol and testing specifications...'

In particular ETSI deals with methodologies, tools and services for the entire lifecycle of technical innovation, thus there is a specific attention to interoperability testing (CTI, Centre for Testing & Interoperability that organises Interoperability events).

A specific attention is paid to the domain of software for telecommunication & broadcast systems, including mobile, fixed and radio communications, that are the core of ETSI activities; still other domains, like for example grid & cloud, eHealth, smart cards, are covered by its activities.

ETSI has also an activity related to pre-standardisation and R&D: ETSI assumes the relationship with Academia and Research as one of the strategic topics and its relationships with R&D projects are viewed as way to help them to interface with the world of standardisation and, on the other side, allow ETSI to be in touch with the last ICT developments.

3.3.2.1 Vision for the future

ETSI's activities are widely present, among the others, in the area of pre-standardisation of the standardisation workgroup of FIA, Future Internet Assembly, with a presence in the areas of Internet of Things, Management of Networks and Distributed Systems, Grid and Cloud Computing

The activities that appear⁵¹ to be in the focus of the Future Internet for ETSI appear to be related both to architectural issues (M2M architecture, network management and security, etc) as well as related to 'sectorial' applications of the IOT, like for example Smart Meters or eHealth devices interoperability.

3.3.2.2 Interesting and ongoing initiatives

Ongoing groups and areas of activities, potentially interesting for our purposes, among the others, are:

⁵⁰ <http://www.etsi.org/WebSite/AboutETSI/AboutEtsi.aspx>

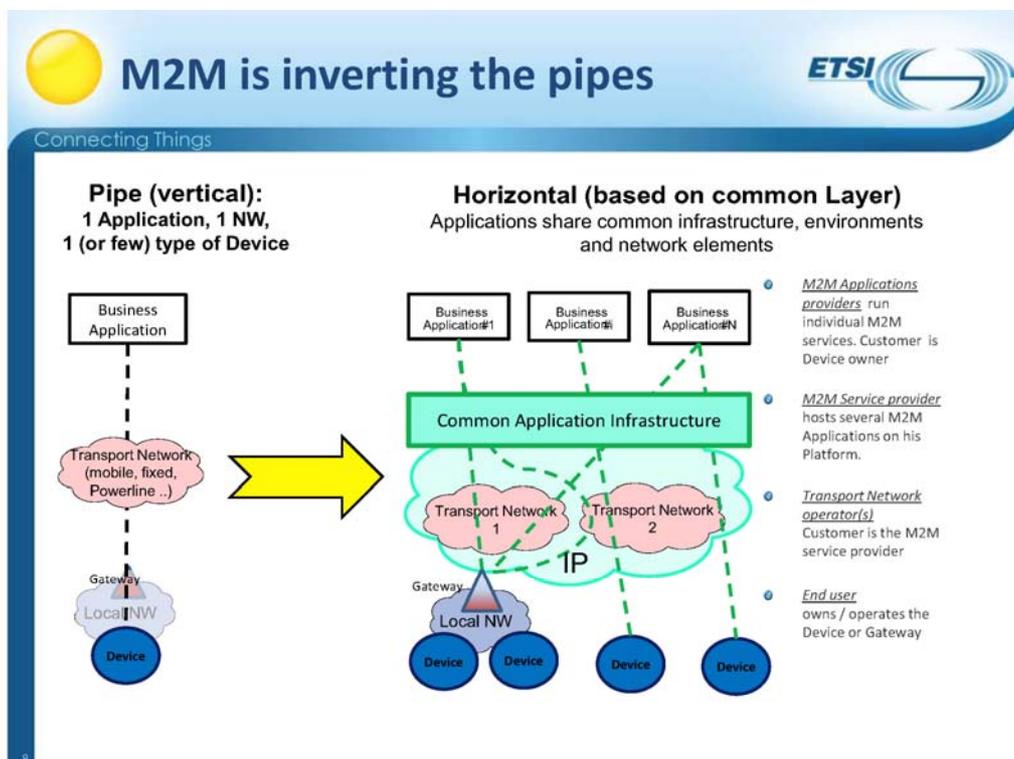
⁵¹ Ghent 2010, FIA Standardisation workshop, <http://standardization-ghent.fi-week.eu/>

- CLOUD (Grid and cloud computing)
- eHEALTH
- ESI (electronic signature and infrastructures)
- M2M (IOT, integration of devices and network)
- ISG (industry specification groups: they are industry fora, focused on specific targets; they are pre-standardisation workgroups):
 - -AFI: Autonomic network engineering for the self-managing Future Internet
 - MTC Mobile Thin Client Computing
 - INS Identity and access management for Networks and Services
 - MOI Measurement Ontology for IP traffic
 - OSG Open Smart Grid

One of the most relevant and systematic initiatives is M2M (Machine To Machine) that is addressing in a systematic way the connections between things with a cluster of activities dealing with M2M Machine to Machine communications (mobile devices), including devices in buildings, production, healthcare, security, energy (production and distribution –smart grids), retail (good tracking, etc) and transport.

The keywords in the scope of ETSI M2M are mobile phones, rfid, smart metering, wireless factories, ehealth, smart cities, connected consumers, cloud,...

The approach proposed in to move from a vertical *ad hoc* approach (one application, one network, one or few type of device) to a horizontal approach to communication (applications sharing common infrastructures and networks).



Slide from "MACHINE TO MACHINE COMMUNICATIONS, ETSI TC M2M Overview", June 2011.

According to ETSI M2M vision, the key elements in such perspective are:

- M2M Device; device capable of replying to request for data contained within those devices or capable of transmitting data autonomously
- M2M Area Network (Device Domain); provide connectivity between M2M Devices and M2M Gateways, e.g. personal area network
- M2M Gateway; uses M2M capabilities to ensure M2M Devices inter-working and interconnection to the communication network
- M2M Communication Networks (Network Domain); communications between the M2M Gateway(s) and M2M application(s), e.g. xDSL, LTE, WiMAX, and WLAN
- M2M Applications; contains the middleware layer where data goes through various application services and is used by the specific business-processing engines⁵².

The central point of this vision is to create a common architecture for the devices and the related communications that is technology independent and common to many applications, with a large re-use of existing standards and service capability.

Ongoing standardization activities related to M2M implementation are, for example:

- EC's M/411 Smart Metering Mandate: to build standards for European smart meters, allowing interoperability and Consumer actual consumption awareness
- EC's M/490 Smart Metering Mandate: to build standards for European Smart Grids.

3.3.2.3 Interesting issues for COIN

M2M appears as an architecture, made of a number of standards and components and with top level applications and services that are totally independent from the devices (the 'things') that are connected.

Due to this approach it could result of some interest to investigate if the COIN approach for the EI service delivery and the model for service platform federation could result of some contribution to M2M vision or, viceversa, if their implementation could take advantage from M2M outcomes and a vision to face the IOT side of the Future Internet.

Others areas of potential interest for the aspects to be related to the COIN infrastructure (GSP, core services) come from

- activity areas CLOUD and ESI (electronic signature and infrastructures)
- industry interest groups INS (Identity and access management for Networks and Services), AFI: (Autonomic network engineering for the self-managing Future Internet) and MOI (Measurement Ontology for IP traffic)

A recommendation is to explore the reciprocal synergies between the federated service platforms architecture of COIN and the M2M architecture in order to apply the IOS paradigms and outcomes in the context of IOT applications and services.

⁵² MACHINE TO MACHINE COMMUNICATIONS, ETSI TC M2M Overview", June 2011, http://docbox.etsi.org/M2M/Open/Information/M2M_presentation.pdf

3.3.3 OASIS

OASIS⁵³ (Organization for the Advancement of Structured Information Standards) is a non-profit association that works for the development, convergence and adoption of the open standards which will improve the standards of information society all over the globe.

OASIS came into being in the year 1993 as Standard Generalized Markup Language (SGML) Open; in the year 1998, the name was changed to OASIS, which included Extensible Markup Language (XML) thereby broadening its spectrum.

There are over 5000 participants in this group of users and vendors, who were entrusted with the task of developing standards and preparing guidelines for proper inter-operation between the products. They are representing more than 600 organizations from over 100 countries.

OASIS is distinguished by its transparent governance and operating procedures.

Members themselves set the OASIS technical agenda, using a lightweight process designed to promote industry consensus and unite disparate efforts. Completed work is ratified by open ballot. Governance is accountable and unrestricted. Officers of both the OASIS Board of Directors and Technical Advisory Board are chosen by democratic election to serve two-year terms. Consortium leadership is based on individual merit and is not tied to financial contribution, corporate standing, or special appointment.

3.3.3.1 Vision for the future

OASIS is member of ITAC⁵⁴ (Internet Technical Advisory Committee), a worldwide coalition of Internet organizations (as IETF, W3C, CEN, IEEE, etc.). The main purpose of the ITAC is to contribute constructively to the OECD's development of Internet-related policies (OECD⁵⁵, Organisation for Economic Co-operation and Development); OASIS, indeed, participated in the OECD High Level Meeting on "The Internet Economy: Generating Innovation and Growth" held on 28-29 June 2011 in Paris, presented as part of the ITAC to provide input on Internet-related issues.

OASIS joined fellow ITAC members in expressing broad satisfaction with the OECD's approach to ensuring the Internet continues to serve as a platform for innovation, economic development and social progress throughout the world, including OECD countries.

Together with other ITAC members, OASIS expressed support for the OECD's "Principles for Internet Policy-Making" *communiqué*⁵⁶, which identifies as fundamental the promotion and protection of the global free flow of information, promotion of the open, distributed and interconnected nature of the Internet; and encouragement of multi-stakeholder cooperation in policy development processes. Among other things, the *communiqué*:

- confirms, at the highest policy-making levels, the **central role of open standards and voluntary cooperation** as the core design principles of the Internet;
- clearly focuses attention on the need to address **data privacy as a global issue**;

⁵³ OASIS, *Organization for the Advancement of Structured Information Standards*, <http://www.oasis-open.org/org>

⁵⁴ ITAC, *Internet Technical Advisory Committee*, <http://www.Internetac.org>

⁵⁵ OECD, *Organisation for Economic Co-operation and Development*, <http://www.oecd.org>

⁵⁶ "Communiqué on Principles for Internet Policy-Making", <http://www.oecd.org/dataoecd/40/21/48289796.pdf>

- acknowledges the need to protect the role of Internet data intermediary entities, **balancing intellectual property rights protections with network integrity and freedom of expression**;
- notes the urgency of **IPv6 adoption**.

John Sabo, chair of the IDtrust Steering Committee, representing OASIS at the meeting. He was joined by ITAC presenters Sir Tim Berners-Lee (W3C), Vint Cerf (NRO) and Leslie Daigle (ISOC). "The trusted use of personal information is integral to the growing value of the open Internet for business and technical innovation, citizen services and consumer applications," said Sabo. "Ensuring that privacy management technologies and risk management practices are also available at Internet scale will require unprecedented **collaboration between policy and technology communities, using the structures and expertise of internationally-accepted standards** development organizations."

OASIS produces global standards organized in 15 categories⁵⁷; 7 of them have been selected because potentially interesting for the COIN project:

- **Cloud**
this technology is fundamental in the COIN service platform based on the u-SaaS concept (SaaS is one of the three type of cloud computing);
- **SOA**
COIN is designed as federation of platforms service-oriented and the OASIS vision of the Future Internet is an "Internet of services" ;
- **Web Services**
for the same reason of SOA choice, we selected the "Web Services" OASIS category because COIN is an architecture service-oriented;
- **Privacy/Identity**
the need to address data privacy as a global issue is one of the main points among the "Principles for Internet Policy-Making" in the Future Internet vision of OECD and ITAC;
- **Conformance**
the ATHENA maturity levels paradigm is inherited in COIN Enterprise Collaboration;
- **e-Commerce**
the COIN project is developed for the enterprise network, mainly SMEs;
- **Supply Chain**
some test cases chosen to analyse and develop COIN are related to supply chains; also, different concepts like "model-driven architecture", "common object models", "public and private processes" are subject of the TCs of this OASIS category as well as COIN.

3.3.3.2 Interesting specifications

For each OASIS category, the Technical Committees that produced specifications inherent COIN project and became OASIS standards have been selected and grouped in : Organisation, Semantic, Technical.

Organisation group

- - SOA Category
 - OASIS SOA Reference Model TC
- - Web Services Category
 - OASIS Web Services Federation (WSFED) TC
 - OASIS Web Services for Remote Portlets (WSRP) TC

⁵⁷ OASIS Committee Categories, http://www.oasis-open.org/committees/tc_cat.php

- OASIS ebXML Business Process TC
- - e-Commerce Category
 - OASIS Business-Centric Methodology (BCM) TC
 - OASIS ebXML Registry TC

Semantic group

- - e-Commerce Category
 - OASIS Content Assembly Mechanism (CAM) TC
 - OASIS Universal Business Language (UBL) TC

Technical group

- - Web Services Category
 - OASIS Web Services Transaction (WS-TX) TC
 - OASIS Web Services Reliable Exchange (WS-RX) TC
 - OASIS Web Services Secure Exchange (WS-SX) TC
- e-Commerce Category
 - OASIS ebXML Messaging Services TC

Several OASIS standards, in their final version, are relevant for the COIN project, interesting for the *e-Business* approach and *Web Services* technology. In particular:

- OASIS standards useful to implement a SOA of web services (Organisation and Technical groups);
- UBL, an XML language to define cross-sectorial business documents (Semantic group).

OASIS, as well as other standard organizations, addresses its efforts in a vision of Future Internet where the ICT architectures are services oriented and based on open and public XML standards..

3.3.3.3 Ongoing initiatives

The Technical Committees producing ongoing initiatives (specifications becoming OASIS standard) inherent COIN project are listed in Annex C and grouped in: Organisation, Semantic, Technical.

Here it is worth to highlight as potentially interested in COIN outcomes, among the others, the following committees:

- OASIS Identity in the Cloud TC
- OASIS Service Component Architecture
- Web Services Category and OASIS ebXML Core (ebCore) TC
- OASIS Production Planning and Scheduling (PPS) TC
- OASIS Semantic Execution Environment TC

The work of OASIS for the next years is expected to be a continuation of the present results: the ICT architectures service-oriented are still the reference model and many draft standards are aimed at improving it with particular attention to the services composition and modelling of processes. This is interesting for the COIN project that joins the service-oriented and model-driven approaches.

In the vision for the next years, several relevant OASIS standards, in their draft version, are interesting for the *Cloud* technology in a *SOA* view and for the *Privacy and Identity* aspects.

Also, in the technical section there are activities related to *Test* to check conformance and interoperability in collaborative frameworks and to validate standard specifications.

The vision of OASIS for the future is an *Internet of Services* and new technology as *Cloud* and new approaches *Test and Model Driven* are compatibles in this direction.

3.3.4 Object Management Group (OMG)

OMG⁵⁸ has been an international, open membership, not-for-profit computer industry consortium since 1989.

OMG's mission is to develop, together with their worldwide membership, enterprise integration standards that provide real-world value. OMG is also dedicated to promoting business technology and optimization for innovation through its Business Ecology[®] Initiative (BEI) program and associated Communities of Practice.

Any organization may join OMG and participate in their standards-setting process. OMG's one-organization-one-vote policy ensures that every organization, large and small, has a effective voice in the process.

OMG membership includes hundreds of organizations, with half being software end-users in over two dozen vertical markets, and the other half representing virtually every large organization in the computer industry and many smaller ones. Most of the organizations that shape enterprise and Internet computing today are represented on OMG Board of Directors.

OMG Task Forces develop enterprise integration standards for a wide range of technologies, including: Real-time, Embedded and Specialized Systems, Analysis & Design, Architecture-Driven Modernization and Middleware and an even wider range of industries, including: Business Modeling and Integration, C4I, Finance, Government, Healthcare, Legal Compliance, Life Sciences Research, Manufacturing Technology, Robotics, Software-Based Communications and Space.

OMG's modeling standards, including the Unified Modeling Language[™] (UML[®]) and Model Driven Architecture[®] (MDA[®]), enable visual design, execution and maintenance of software and other processes, including IT Systems Modeling and Business Process Management. OMG's middleware standards and profiles are based on the Common Object Request Broker Architecture (CORBA[®]) and support a wide variety of industries.

The requirements document that initiates each OMG standard-setting activity (the Request for Proposal) and other key documents are available for viewing by anyone, member or not. Email discussion, meeting attendance, and voting are restricted to members; though prospective members are invited to attend a meeting or two as a guest observer.

Dozens of standards organizations and other consortia maintain liaison relationships with OMG. OMG is an ISO PAS submitter, able to submit OMG specifications directly into ISO's fast-track adoption process. OMG's UML, MOF[™] and Interface Definition Language (IDL[™]) standards are already ISO standards and ITU-T recommendation.

3.3.4.1 OMG: Vision for the future,

OMG's vision is to develop enterprise integration standards.

In addition to that OMG aims at promoting business technology and optimization for innovation through its new initiative called Business Ecology[®] Initiative (BEI) program and associated Communities of Practice.

⁵⁸ <http://www.omg.org>

OMG has started a new initiative called Cloud Standards Customer Council (CSCC). Cloud technology is considered by OMG a strategic area for the future. In particular OMG believes that:

- Cloud computing adoption is a key enabler for the 21st century enterprise
- Achieving the benefits of cloud computing requires significant changes for both IT and business executives
- Cloud computing is perceived by business executives as an IT integration and productivity story, rather than a business agility story
- Cloud computing practitioners would greatly benefit from a vibrant practitioner community to drive local, business-driven, cloud success, and to spur broader enterprise, and industry-wide, cloud adoption.

3.3.4.2 Interesting OMG specifications for COINS.

OMG has produced a number of specifications in the past years. In this document⁵⁹, we have selected OMG Technologies that are relevant for COIN. They can be classified as follows:

- OMG Business Modeling Specifications⁶⁰:
 - Business Motivation Model (BMM)
 - Business Process Definition Metamodel (BPDM)
 - Business Process Maturity Model (BPMM)
 - Business Process Model and Notation (BPMN)
 - Production Rule Representation (PRR)
 - Semantics of Business Vocabulary and Business Rules (SBVR)
 - Workflow Management Facility
- OMG Domain Specifications⁶¹:
 - Business Motivation Model (BMM)
 - Business Process Definition Metamodel (BPDM)
 - Specification Name: Business Process Maturity Model (BPMM)
 - Currency (CURR)
 - Specification Name:General Ledger (LEDG)
 - Specification Name:IT Portfolio Management Facility (ITPMF)
 - Specification Name:Identity Cross-Reference Service (IXS)
 - Management of Event Domains
 - Metamodel for the Federal Transition Framework (FTF)
 - Model Driven Message Interoperability (MDMI)
 - Negotiation Facility (NEG)
 - OMG Systems Modeling Language (OMG SysML)
 - Platform Independent Model (PIM) & Platform Specific Model (PSM) for Super Distributed Objects (SDO)
 - Requirements Interchange Format (ReqIF)
 - Resource Access Decision (RAD)
 - Retrieve, Locate, and Update Service (RLUS)
 - Semantics of Business Vocabulary and Business Rules (SBVR)

⁵⁹ See also Elvesæter, B., Berre, A.-J. (2010): *OMG Specifications for Enterprise Interoperability. IESA 2010, workshop "Standardisation – a foundation for Interoperability" Coventry, United Kingdom, April 13, 2010.*

⁶⁰ The detailed description available at: http://www.omg.org/technology/documents/br_pm_spec_catalog.htm

⁶¹ The detailed description available at: http://www.omg.org/technology/documents/domain_spec_catalog.htm

- Task and Session (TSKSES)
- UML Profile for Enterprise Application Integration (EAI)
- UML Profile for Enterprise Distributed Object Computing (EDO)
- Workflow Management Facility

- **OMG Modeling and Metadata Specifications⁶²:**
 - Common Warehouse Metamodel (CWM™)
 - Common Warehouse Metamodel (CWM™) Metadata Interchange Patterns (MIP)
 - Concrete Syntax for UML Action Language [Action Language for Foundational UML] (ALF)
 - Meta Object Facility (MOF™)
 - Model Driven Message Interoperability (MDMI)
 - MOF™ Support for Semantic Structures (SMOF)
 - MOF™ 2.0 Versioning and Development Lifecycle (MOFVD)
 - Object Constraint Language (OCL)
 - Ontology Definition Metamodel (ODM)
 - Semantics of a Foundational Subset for Executable UML Models (FUML)
 - Service oriented architecture Modeling Language (SoaML®)
 - Software Process Engineering Metamodel (SPEM)
 - Unified Modeling Language™ (UML®)
 - UML Diagram Interchange (UMLDI)
 - UML Human-Usable Textual Notation (HUTN)
 - XML Metadata Interchange (XMI®)

3.3.4.3 Ongoing OMG initiatives and potential interest for COIN.

There are three areas of the ongoing work of the OMG that are related to the work of COIN:

- a. OMG Cloud Standards Customer Council (CSCC)
- b. OMG Technology driven standards
- c. OMG Business Ecology Communities (BEI) of Practice
- d.

Each of them is analyzed in the following:

a. COIN and OMG Cloud Standards Customer Council (CSCC)

The Cloud Standards Customer Council (CSCC) is an end user advocacy group dedicated to **accelerating cloud's successful adoption**, and drilling down into the standards, security and interoperability issues surrounding the transition to the cloud.

The Council is **not a standards organization**, but will complement existing cloud standards efforts and establish a core set of client-driven requirements to ensure cloud users will have the same **freedom of choice, flexibility, and openness** they have with traditional IT environments. The Cloud Standards Customer Council is open to all end-user organizations. CA Technologies, IBM, Kaavo, Rackspace and

⁶² The detailed description of each of these specifications is available at:
http://www.omg.org/technology/documents/modeling_spec_catalog.htm

Software AG are Founding Sponsors with the aim to create a practitioner community to drive local, business-driven, cloud success, and to spur broader enterprise, and industry-wide, cloud adoption (see Annex D.1 for details about CSCC).

The approach of the initiative is based on the principles of the “**Open Cloud Manifesto**” “Dedicated to the belief that the cloud should be open”⁶³.

The results produced by COIN in the area of Enterprise Interoperability and Generic Service Platform (GSP) are both relevant to the Cloud Standards Customer Council (CSCC) activities (see Annex D.2 for details).

b. COIN and OMG Technology driven standards

COIN results are relevant to a number of current standardization activities of the OMG Technology Driven Standards: cloud working group, middleware, cloud modeling, verticals (see Annex D.3 for details).

In particular the activity related to OMG Semantic Information Modeling for Federation (SIMF) appears to be very focused on some of the core interests of COIN. The activity is at the beginning and there is a good opportunity to contribute effectively to its development.

c. COIN and OMG Business Ecology Communities (BEI) of Practice⁶⁴

The Business Ecology® Initiative (BEI) is a non-profit, member-led organization committed to promoting effective, adaptive, sustainable and secure practices both within organizations and among them. BEI provides thought leadership, education and advocacy for Business Ecology practices and a platform for the development and sharing of case studies and practices among business and technology leaders.

The Business Ecology Initiative is not a standards group, but an advocacy group. However because it is managed by OMG it does have influence, in terms of helping to prompt and promote usage of open standards, that may be relevant to the work of Business Ecology.

Business Ecology Initiative participants include users and vendors of business-technology products and services, universities, analyst groups, government agencies and non-profit companies interested in promoting the message and value of Business Ecology.

Cloud computing is one of several Business Ecology Enablers for BEI. Cloud computing plays a role in outsourcing business processing and optimizing IT service delivery. A natural extension of cloud computing would be that eventually there is no standalone IT department in the company, however there is still IT in the organization, embedded in organizational units, at the point of value generation. IT people become business optimization people (automating, streamlining and outsourcing).

Topic areas – BPM/SOA, Cyber Security, Event Processing and Green CIO – are all enablers of Business Ecology..

In concrete, at least the experiences of the COIN Pilots can be submitted to the BEI community as **Best Practices** of open cloud.

⁶³ <http://www.opencloudmanifesto.org>

⁶⁴ <http://www.business-ecology.org/index.htm>,

<http://www.omg.org/edm-council/2010-review-cop.htm>

3.3.4.4 Assessment and Recommendations

Several results obtained by COIN are relevant to some of the key ongoing activities of the OMG, in particular: the **OMG cloud working group, middleware, cloud modeling, verticals**, and the **Cloud Standards Customer Council**.

Again there is a current activity on OMG Semantic Information Modeling for Federation (SIMF) that could get valuable contributions from COIN outcomes.

It is recommended that CON considers to be an active participation in some of these initiatives. In particular, the Cloud Standards Customer Council is a timely opportunity for COIN to profile itself in an highly relevant area for the future of enterprise computing.

3.3.5 World Wide Web Consortium (W3C)

“The World Wide Web Consortium (W3C) is an international community where Member organizations, a full-time staff, and the public work together to develop Web standards

The W3C mission is to lead the World Wide Web to its full potential by developing protocols and guidelines that ensure the long-term growth of the Web.”⁶⁵

W3C standards define an “Open Web Platform” for application development that has the unprecedented potential to enable developers to build rich interactive experiences, powered by vast data stores, that are available on any device. Although the boundaries of the platform continue to evolve, industry leaders speak nearly in unison about how HTML5 will be the cornerstone for this platform. But the full strength of the platform relies on many more technologies that W3C and its partners are creating, including CSS, SVG, WOFF, the Semantic Web stack, XML, and a variety of APIs.

W3C technologies and standards are organised in 7 main areas:

- Web Design and Applications
- Web Architecture
- Semantic Web
- XML Technology
- Web of Services
- Web of Devices
- Browsers and Authoring Tools

W3C develops these technical specifications and guidelines through a process designed to maximize consensus about the content of a technical report, to ensure high technical and editorial quality, and to earn endorsement by W3C and the broader community.

3.3.5.1 Vision for the future

W3C is member of ITAC⁶⁶ (Internet Technical Advisory Committee), a worldwide coalition of Internet organizations as OASIS (par. 2.3.3.1), IETF, CEN, IEEE, ecc. The main purpose of the ITAC is to contribute constructively to the OECD’s development of Internet-related policies (OECD⁶⁷, Organisation for Economic Co-operation and Development).

W3C and the other ITAC members expressed support for the OECD’s communiqué “Principles for Internet Policy-Making”⁶⁸, which identifies as fundamental:

- the promotion and protection of the global free flow of information
- promotion of the open, distributed and interconnected nature of the Internet
- encouragement of multi-stakeholder cooperation in policy development processes.

⁶⁵ <http://www.w3.org/Consortium/>

⁶⁶ ITAC, Internet Technical Advisory Committee, <http://www.Internetac.org>

⁶⁷ OECD, Organisation for Economic Co-operation and Development, <http://www.oecd.org>

⁶⁸ “Communiqué on Principles for Internet Policy-Making”, <http://www.oecd.org/dataoecd/40/21/48289796.pdf>

W3C wants to lead the World Wide Web to its full potential; to do this, in the last years, W3C developed many standards that are basic for Internet (HTML, HTTP, XML and XML Schema, ecc.) and one of its current effort is improve these specifications and develop other standards to facilitate their adoption in the world.

In particular, in relation with Interoperability and Collaboration Services issues, W3C vision of the Future Internet is summarizable in three interesting points:

1. Web for All:

- *Web accessibility* means that people with disabilities can perceive, understand, navigate, and interact with the Web, and that they can contribute to the Web. Web accessibility also benefits others, including older people with changing abilities due to aging;
- *Internationalization* is an activity to ensure that W3C's formats and protocols are open to all of the world's languages, writing systems, character codes and local conventions;
- *Mobile Web for Social Development* Interest Group explores how to use the potential of Information and Communication Technologies (ICTs) on Mobile phones as a solution to bridge the Digital Divide and provide minimal services (health, education, governance, business,...) to rural communities and under-privileged populations of Developing Countries;

2. **Internet of Services:** is an application of Internet, where classical barriers and inefficiencies are removed from service access. W3C sees the WWW used for application to application communication, the programmatic interfaces made available are referred to as Web Services;

3. **Semantic Web:** is a "*man-made woven web of data*" that facilitates machines to understand the semantics, or meaning, of information on the WWW. The concept of Semantic Web applies methods beyond linear presentation of information (Web 1.0) and multi-linear presentation of information (Web 2.0) to make use of *hyper-structures* leading to entities of hypertext.

3.3.5.2 Interesting W3C specifications

W3C is one of most important standardization organization. It has developed standards that are the base of actual Internet (HTTP, HTML, XML and XML Schema are W3C standards) or specification that are basic for the Internet infrastructure (for example, the W3C Recommendation "Architecture of the WWW").

The table in Annex E, for each W3C Area the W3C Themes and for each W3C Theme, shows in detail the most interesting and promising specifications (both Recommendation and Draft) for COIN; basic and known specifications, like for example HTML and XML, are not considered.

The specifications in the table have been chosen when their possible application could be interesting and fruitful in the COIN vision.

Thus the Future Internet from the W3C point of view appears to be summarized by the following lines:

1. **Web for All:** many initiatives are about accessibility and internazionalization of standards, many specifications have become "W3C Recommendations", other specifications have the status of "submitted" or "candidate";
2. **Internet of Services:** W3C activities about web services in the last years were important to obtain a consolidated and solid *services-oriented architectur*; a lot of W3C Recommendations and documentation of the Working Groups are now in place; other WS-* specifications are candidate to become recommendation (in 2011, W3C has released seven Candidate Recommendation about WS Resource Access);
3. **Semantic Web:** there are many W3C Recommendations about RDF and OWL technologies and other related specifications are work in progress.

3.3.5.3 Ongoing W3C specifications

An interesting W3C activity is the work in the Incubator Groups.

From W3C.org⁶⁹:

"The scope of Incubator Groups (XGs) is expected to be:

- New, potentially foundational technologies. This includes ideas for technologies with the potential for broad use to support the infrastructure of the Web. However, these ideas are not ready for Recommendation Track development. Some characteristics of relevant foundational concepts include, but are not limited to:
 - Innovative and/or highly speculative ideas that may or may not be entirely consistent with the current Web architecture or with other work at W3C and elsewhere.
 - Functions for which the design is not yet well-enough developed or for which there are many possible solutions.
 - Functions for which there is not yet sufficient consensus in the community.
- Web-Based Applications built upon the infrastructure of the Web. Some characteristics of such applications include, but are not limited to:
 - Work that builds upon W3C's foundational work, as a means of helping to test that foundation.
 - Work needed to support the efforts of particular user communities to leverage Web technologies, and thus provide additional practical experience on use of those technologies.
 - Work with very broad application across multiple user communities.
 - Open source software that builds upon Web technologies."

1. <http://www.w3.org/2005/Incubator/about.html>

Area XGs: Incubator Groups

Incubator Group	Interesting Specification for COIN	Mission	Docs
WebID	Yes	To further advance the WebID protocol , an authentication protocol that uses the SSL/TLS layer for user identification by tying the client to a profile document on the Web through placing a URI in a certificate.	WebID
Federated Social Web	Work in Progress	To provide a set of community-driven specifications and a test-case suite for a federated social web.	Wiki
Media Analysis Management Interface	No	To discuss the requirements and determine the feasibility of the "Media Analysis Management Interface" which consists of the data model and exchange protocol for the analysis data of various media, such as video images, RFID sensor data, and so on.	
Object Memory Modeling	No	To define an object memory format, which allows for modeling of events or other information about individual physical artifacts - ideally over their lifetime - and which is explicitly designed to support data storage of those logs on so-called smart labels attached to the physical artifact.	
Unified Service Description Language	Yes	To define a language for describing general and generic parts of technical and business services to allow services to become tradable and consumable. (it is an update of USDL specifications)	Charter
HTML Speech	No	To determine the feasibility of integrating speech technology in HTML5 in a way that leverages the capabilities of both speech and HTML (e.g., DOM) to provide a high-quality, browser-independent speech/multimodal experience while avoiding unnecessary standards fragmentation or overlap.	
Audio	No	To explore the possibility of starting one or more specifications dealing with various aspects of advanced audio functionality, including reading and writing raw audio data, and synthesizing sound or speech.	
Decisions and Decision-Making	Work in Progress	To determine the requirements, use cases, and a representation of decisions and decision-making in a collaborative and networked environment suitable for leading to a potential standard for decision exchange, shared situational awareness, and measurement of the speed, effectiveness, and human factors of decision-making.	Charter
Library Linked Data	Work in Progress	To help increase global interoperability of library data on the Web, by bringing together people involved in Semantic Web activities—focusing on Linked Data—in the library community and beyond, building on existing initiatives, and identifying collaboration tracks for the future.	Charter
Open Web Education Alliance	No	To help enhance and standardize the architecture of the World Wide Web by facilitating the highest quality standards and best practice based education for future generations of Web professionals through such activities as <ul style="list-style-type: none"> - fostering open communication channels for knowledge transfer - curriculum sharing between corporate entities, educational institutions, Web professionals, and students. 	

The W3C current work confirms that the vision of the Future Internet of W3C is based on Semantic Web and through the description of services and resources; a new aspect in this vision is related to the

“standards globalization”: the unification and convergence of architectures and methodologies to obtain a unique federation of platforms, with unified semantics and universal identifiers (the Incubators related to WebID, Federated Social Web, USDL, and Library Linked Data are potentially the best recipients for the COIN outcomes).

3.3.6 UN/CEFACT

The UN/CEFACT⁷⁰ (United Nations Centre for Trade Facilitation and Electronic Business) is a subsidiary, intergovernmental body of the UNECE⁷¹ (United Nations Economic Commission for Europe) Committee on Trade, operating since 1996.

It has the mission to develop a program of work of global relevance to achieve improved worldwide coordination and cooperation in the areas of trade facilitation and electronic business, covering both commercial and government business processes that can foster growth in international trade and related services. It encourages close collaboration between governments and private business to secure the interoperability for the exchange of information between the public and private sector.

UN/CEFACT supports activities dedicated to improving the ability of business, trade and administrative organizations, from developed, developing and transition economies, to exchange products and relevant services effectively. Its principal focus is on facilitating national and international transactions, through the simplification and harmonization of processes, procedures and information flows, and so contributing to the growth of global commerce⁷².

3.3.6.1 Vision for the future

In UN/CEFACT there is a discussion about the technical framework for its future activities in order to focalise the outputs to be produced; among different possible approaches, the development of core components and the maintenance of EDIFACT are foreseen as a firm point.

It is to observe that the e-business focus is very *message exchange-oriented* rather than *service oriented*. Technically nothing prevents users from implementing core components in service contracts and registries, but that is not the main focus of most of the stakeholders (most with long EDI tradition).

3.3.6.2 Most relevant existing standards

UN/CEFACT fulfils its mission by publishing standards, specifications, recommendations and user guides (collectively referred to as "publications") for the pillars - processes, information and technology - that are vital in the development of world trade. More in details, the types of publications are:

- **UN/CEFACT Technical Specifications:** Specifications established by consensus within the UN/CEFACT Forum to establish how one or more Business Standards and/or Recommendations shall be developed.
- **UN/CEFACT Business Standards:** Specifications established by consensus within the Forum that provide rules, guidelines and/or principals related to activities in the context of trade facilitation or electronic business.

⁷⁰ <http://live.unece.org/cefact/index.html>

⁷¹ <http://unece.org/>

The UNECE is one of five regional commissions of the United Nation. Its major aim is to promote pan-European economic integration. To do so, UNECE brings together 56 countries located in the European Union, non-EU Western and Eastern Europe, South-East Europe and Commonwealth of Independent States (CIS) and North America. All these countries dialogue and cooperate under the aegis of the UNECE on economic and sectorial issues.

⁷² Reference: Previous Mandate and Terms of Reference of UN/CEFACT, TRADE/R.650/Rev.4, 25 April 2005, http://live.unece.org/fileadmin/DAM/cefact/cf_plenary/plenary06/trd_r650_rev4e.pdf

- **UNECE Recommendations:** Trade facilitation or electronic business standards that provide formal guidance to Governments, the private sector and the business community.
- **UN/CEFACT Implementation Guides:** Informative (in contrast to normative) documents and/or audio/video productions that provide guidance to publication implementers.

Other publication types exist and more will likely emerge. This document does not address these publication types. Examples of such publications include:

- **CEFACT Glossary;**
- **CEFACT eBusiness Architecture.**

Publications are the results of a process called "The Opened Development Process"⁷³ at the end of which they are published to the web site and can generally be implemented without fees or restrictions⁷⁴.

The following paragraphs describe the subset of UN/CEFACT's publications having potential intersections with the objectives and results of COIN project.

They have been considered because, potentially, they could be relevant for potential ISU implementations and applications.

3.3.6.2.1 UNECE Recommendations

Over the past 40 years, UN/CEFACT has developed and maintained a series of 35 recommendations, which reflect best practices in trade procedures and data and documentary requirements and are used worldwide to simplify and harmonize trade procedures and information flows. Some of these are now international standards of the International Organization for Standardization (ISO).

The full list of recommendations is available on:

http://live.unece.org/cefact/recommendations/rec_index.html.

From COIN's point of view, Recommendations that should be considered in the implementation of ISU are:

Recommendation Number	Title	Description	Last revision approved
Recommendation N°. 1	United Nations Layout Key for Trade Documents	It presents the United Nations Layout Key for trade documents, the rules for the location of codes used in this context and explains the United Nations System of Aligned Trade Documents.	1981 Guidelines for implementation have been approved on March 2001.
Recommendation N°. 3	Code for the Representation of Names of Countries	It recommends that the two-letter alphabetic code referred to in the International Standard ISO 3166 as "ISO ALPHA-2 Country Code", should be used for	1996 <i>NB:</i> ISO 3166-1-alpha-2 code elements are

⁷³ *Open Development Process, TRADE/R.650/Rev.4/Add.1/Rev.1, 16 May 2007, http://live.unece.org/fileadmin/DAM/cefact/documents/trd_R650_R4_A1E_R1_revisedODP.pdf*

⁷⁴ *Details about UN/CEFACT Intellectual Property Rights (IPR) Policy are explained in document ECE/TRADE/CEFACT/2006/11 available at http://live.unece.org/cefact/cf_docs.html or from the UNECE secretariat.*

		representing the names of countries for purposes of International Trade whenever there is a need for a coded alphabetical designation.	periodically updates by ISO
Recommendation N°. 5	Abbreviations of INCOTERMS	It recommends the use of agreed abbreviations for the International Chamber of Commerce's (ICC) trade terms, known as INCOTERMS 2000, for acceptance and use by Governments and international organizations whenever these terms are used in abbreviated form, including in electronic data transmission and processing.	2000 (2011 - incoming update)
Recommendation N°. 6	Aligned Invoice Layout Key for International Trade	It provides a layout key for commercial invoice, aligned with the United Nations Layout Key, for use in international trade. The last update (2011) contains a new annex prepared in order to accommodate electronic invoicing.	2011
Recommendation N°. 7	Numerical Representation of Dates, Time and Periods of Time	It establishes a method for a standardized and unambiguous all-numerical designation of a given date, a given time of the day and a given period of time.	1988
Recommendation N°. 9	Alphabetic Code for the Representation of Currencies	It encourages the use of the three-letter alphabetic codes of the International Standard ISO 4217, "Codes for the representation of currencies and funds", for application in international trade and their use in commercial transactions when currencies are expressed in coded or abbreviated form.	1996 <i>NB:</i> ISO 4217 currency names and code elements are periodically updates by ISO.
Recommendation N°. 16	LOCODE Code for Trade and Transport Locations	It recommends a five-letter alphabetic code for abbreviating names of locations such as ports, airports, inland freight terminals, and other locations where Customs clearance of goods can take place, and whose names need to be represented unambiguously in data interchange.	1998 Last version of UN/LOCODE Code List: 2011-1
Recommendation N°. 17	PAYTERMS Abbreviations for Terms of Payment	It provides abbreviations to certain terms of payment, referred to as "PAYTERMS", for use in international trade transactions as appropriate.	1982
Recommendation N°. 19	Code for Modes of Transport	It establishes a common code list for the identification of the modes of transport.	2001
Recommendation N°. 20	Codes for Units of Measure Used in International Trade	It provides three character alphabetic and alphanumeric codes for representing units of measurement for length, area, volume/capacity, mass (weight), time, and other quantities used in international trade.	2010
Recommendation N°. 21	Codes for Passengers, Types of Cargo, Packages and Packaging Materials (with Complementary Codes for Package	Presents coded representations for the package type names used in international trade.	2010

	Names)		
Recommendation N°. 23	Freight Cost Code - FCC	It provides a naming system to be used to establish harmonized descriptions of freight costs and other charges related to the international movement of goods.	2011
Recommendation N°. 24	Trade and Transport Status Codes	Provides Transport Status Codes to satisfy requirements for exchanging coded information about the status of consignments, goods or means of transport at a certain time or place in the transport chain.	2009
Recommendation N°. 28	Codes for Types of Means of Transport	It establishes a common code list for the identification of the type of means of transport.	2010

In particular COIN's results related to these recommendations are the Baseline EI Services because they supports model transformations and semantic reconciliation mechanisms applied to business documents, business processes and enterprise models that are the topics the UN/CEFACT recommendations are mainly focused on.

3.3.6.2.2 UN/CEFACT Standards

Business Requirements Specification (BRS)

The following table describes a subset of the UN/CEFACT Business Requirement Specifications.

They provide **standardized models** (in terms of business processes, transactions and information entities) related to several business contexts, aiming to facilitate the information exchange in electronic business scenarios.

They can be considered applicative level standards.

From COIN point of view they are relevant because services supported by COIN platforms could be an implementation or extension of such standard models.

Title	Description	Approval
Accounting in Supply Chain Process	The objective of this document is to standardize the Accounting Token as a container of the accounting elements as information entity to attach to the Business transactions that enable software agents to automate creation of accounting entry at each side of the business partnership. The Accounting Token is a Business Information Entity (BIE) that is (re)-useable by each transaction of a business scenario on provision that opening toward accounts identification is requested on the one side, and restored on the other side.	March 2007
Cross Industry Invoice	The objective of this document is to standardize the Business processes, the Business transactions and the Information entities of the invoice used by the industries in the supply chain.	February 2006 (v1.0) November 2008 (v2.0)
Cross Industry	The objective of this document is to standardize the Business processes, the Business transactions and the Information entities of the Quotation used by the	April 2010

Quotation	industries in the supply chain.	
Cross Industry Remittance Advice	The objective of this document is to standardize the Business Processes, the Business Transactions and the Information entities of the Remittance Advice used by the industries in the supply chain.	2006
Electronic Agreement Template and Process	The objective is to create a non-refutable, legally executed, electronic model agreement and predictable standard process for a supply chain business application. Partners will be enabled to enter electronic business agreements to exchange their specific enterprise versions of the agreement and then negotiate a consensus of that agreement to specify the terms and conditions of their business arrangement. This process must include the designation of a standard mechanism for authenticating digital signatories and identity verification and validation.	June 2006
e-Tendering	This project aims to standardize business process and information entity of cross-industrial electronic tendering.	March 2005 April 2007

Requirements Specification Mappings (RSM)

The following table describes a subset of the UN/CEFACT Requirements Specification Mappings.

They provide standardized **business process and information entity models** for some business domains, aiming to facilitate the information exchange in electronic business scenarios.

As for BRS they can be considered applicative level standards and services supported by COIN platforms could be an implementation or extension of such standard models.

Title	Description	Approval
eTendering	This specification describes the data model and targeted technology solutions for the cross-industrial electronic tendering process.	June 2009
Cross Industry Invoice	This specification describes the data model and targeted technology solutions for the invoicing process. It is based on the UN/CEFACT Core Component Library (CCL)	July 2009

- **UN/EDIFACT (United Nations rules for Electronic Data Interchange for Administration, Commerce and Transport)**

It comprises a set of internationally agreed standards, directories, and guidelines for the electronic interchange of structured data, between independent computerized information systems.

EDIFACT has been adopted by the ISO as the ISO standard ISO 9735.

- **XML Schemas**

XML Schemas for Code Lists, Identifier Lists and Business Data/Messages (for example Cross Industry Invoice) are available here:

http://www.unece.org/uncefact/xml_schemas/index.htm

3.3.6.2.3 UN/CEFACT Technical Specifications

Following specifications can be considered such as a kind of guidelines to use in modeling business scenarios and related solutions for the electronic data exchange.

Modelers and developers of software applications, like ISU, should take them as reference.

- **Core Components Data Type Catalogue**
It defines the rules for developing Core Data Types and Business Data Types to define the value domains for Basic Core Components Basic Core Component Properties, Basic Business Information Entities, and Basic Business Information Entity Properties.
- **Core Component Technical Specification (CCTS)**
It defines a meta model and rules necessary for describing the structure and contents of conceptual and logical data models and information exchange models.
- **UML Profile for Core Components (UPCC)**
This document provides a mapping of the CCTS to UML as a formal UML profile.
- **UN/CEFACT Modelling Methodology (UMM)**
UN/CEFACTs Modeling Methodology (UMM) is a UML modeling approach to design the business services that each business partner must provide in order to collaborate. It provides the business justification for the service to be implemented in a service-oriented architecture (SOA).
- **XML Naming and Design Rules**
It defines an architecture and set of rules necessary to define, describe and use XML to consistently express business information exchanges. It is based on the World Wide Web consortium suite of XML specifications and the UN/CEFACT Core Components Technical Specification.

3.3.6.3 Ongoing initiatives

UN/CEFACT is composed of five permanent groups that could be considered the incubators for new specifications:

- **Applied Technologies Group (ATG)** is responsible for the creation and maintenance of the trade, business and administration document structures that are based on a specific technology or standard. The function of the ATG is the design, assembly and production of syntax specific solutions based on identified business and/or technical requirements from the empowered groups of UN/CEFACT.
- **International Trade and Business Processes Group (TBG)** is responsible for business and governmental business requirements and content. This is achieved by initiating developments in the areas of process analysis, best practices, and international trade procedures.
- **Techniques and Methodologies Group (TMG)** provides all UN/CEFACT Groups with Meta (base) Business Process, Information and Communications Technology specifications, recommendations and education. The TMG also functions as a research group evaluating new information and communication technologies (ICT), as well as techniques and methodologies that may assist UN/CEFACT and its groups to fulfil their mandate and vision in trade facilitation and e-business.

- **Legal Group (LG)** ensures that the legal aspects of electronic business and international trade facilitation are considered in the work of the UN/CEFACT.
- **Information Content Management Group (ICG)** has the mandate to take all the steps necessary to ensure the release of quality technical specifications for e-business.

In particular mainly ATG, TBG and TMG are engaged in developing new specifications; among them we highlight some ones that could be of interest for the future developments of platforms and services based on COIN's outcomes:

ATG's Draft Specifications:

1. **UN/CEFACT Standard Business Document Header (SBDH) v1.3:** defines the 'Standard Business Document Header' which will enable integration of documents between internal applications, enterprise applications, and business-to-business infrastructure by providing a consistent interface between applications. The standard header information will enable any application to determine the logical routing requirements and/or the logical processing requirements of a document based on information contained in the standard header. This can be accomplished with the use of key data elements including logical sender and recipient identifiers, a 'business document type', and other elements associated with a Standard Business Document.

TMG's Draft Specifications:

1. **Core Components Message Assembly (CCMA)**⁷⁵
2. **UN/CEFACT Context Methodology (UCM).** UN/CEFACT Context Methodology (UCM) will be a context methodology for organizing, expressing, assigning, and applying context through the use of context values for a number of UN/CEFACT standard artefacts, such as Business Data Type, Business Information Entity, Business Message, Business Area, Business Process Models etc. The UCM will also be applicable further than the UN/CEFACT specifications. UCM will be based on the current context mechanism described in the Core Components Technical Specification (CCTS).⁷⁶

⁷⁵ Presently no activities appear to be ongoing on this draft.

⁷⁶ <http://www1.unece.org/cefact/platform/display/public/UCM++UNCEFACT+Context+Methodology>

3.3.7 Open Grid Forum (OGF)

Open Grid Forum "...is an open community committed to driving the rapid evolution and adoption of applied distributed computing. Applied Distributed Computing is critical to developing new, innovative and scalable applications and infrastructures that are essential to productivity in the enterprise and within the science community. OGF accomplishes its work through open forums that build the community, explore trends, share best practices and consolidate these best practices into standards"⁷⁷.

This group was born to deal with GRID issues but now it has a growing interest to Cloud and has the ambition to contribute to Cloud standardisation starting from its background in the Grid standardisation.

Initiatives related to Cloud are managed by one of the five areas of the standardisation group (Infrastructure⁷⁸), in particular there is a set of specifications⁷⁹ (with the status of pre-Recommendation) addressing the OCCI (Open Cloud Computing Interface) that could be interested into the CLOUD related COIN outcomes.

GFD.185	Open Cloud Computing Interface - RESTful HTTP Rendering	2011-06-21
GFD.184	Open Cloud Computing Interface – Infrastructure	2011-06-21
GFD.183	Open Cloud Computing Interface - Core	2011-06-21

⁷⁷ <http://www.gridforum.org/>

⁷⁸ The Areas of the standardisation group: **Applications, Architecture, Compute, Data, Infrastructure, Management, Security.**

⁷⁹ <http://www.ogf.org/gf/docs/?rec&all>

4. Structuring the world of relevant standards for enterprise interoperability: the methodology to investigate relationships between IT research and standardisation

4.1 The problem

The COIN commitment has been to collect, analyse and frame all the potential implications between standardisation issues and COIN project outcomes.

The request was tackled from two different perspectives:

- how the project outcomes could contribute to the standardisation (including adoption)
- how the project outcomes (and actors) can get advantage from standards.

The main reference about facilitating the relationships between an IT research project and standardisation are the outcomes of the COPRAS (COoperation Platform for Research And Standards, <http://www.w3.org/2004/copras/>) project (see Annex F for a short summary) and it is worth to start from here.

As already written, the approach of the guidelines of COPRAS could be summarized on three corner stones:

- standardization as an opportunity for IT projects to disseminate their outcomes
- identification and planning of standardization established since the beginning of the project activities
- direct involvement of the project with standardization bodies.

COPRAS has been our reference but it has required some additional effort in order to be applicable in the context of this work, due to some aspects of the COIN case:

- the project, being a large integrated project, has produced a great amount and variety of outcomes, in a wide range of domains, uneasy to manage by a single expert;
- the time frame of the project do not fit the time scale of a standardization initiative and, consequently, the project itself is not interested in being an actor of standardization in first hand;
- the project has also a 'visionary' course being connected with the ideas of the future evolutions of the Internet;
- it is important to prioritize project standardization potentialities with a reference to the European future standardization policies;

- the project is interested to think in a bidirectional way the relationships with the standardization world.

For these reasons the approach to be implemented has to fulfill the following additional requirements:

- subdivide the domain of interest, to facilitate the reconciliation between project outcomes and standardization initiatives in the same sub-domain
- deal with skills of different highly specialized people
- consider the 'political' perspective (and priorities) of standardization world
- consider the relationships between the project and standardization as bidirectional
- implement different types of relationships between project and standardization.

The result of the processing of these requirements has been the methodology that is presented in the following paragraph: in short it moves from a mono dimensional investigation (*how my results could be standardized*) to a three dimensional evaluation:

- potential of my outcomes for future standardization,
- potential of present standardization for my future developments and follow-up,
- potential interest for European standardization policies and priorities in terms of strategies and standard adoption fostering.

4.2 The adopted approach to identify relationships between COIN and Standardisation

The proposed methodology is a process that can be applied in order to identify potential synergies between research projects outcomes and the world of standards and standardisation.

Talking about identifying synergies we intend checking *if* and *how* the results achieved within one world could contribute in improving the other one.

The methodology we adopted goes through the following **five steps**:

1. **definition of a domain grid** in order to subdivide the domain under analysis in respect to the topics/problems on which we want to compare and to reconcile the world of standardization (existing or coming specifications) and the project outcomes;
2. **analysis and selection of project outcomes** in order to identify their reference in the grid and evaluate their potential relationships with actual or future standards; the evaluation could be performed with different criteria, dependently the potential of innovation we are looking for; in the COIN case it was decided to take into account two factors: *innovation* (which represents the degree of innovation of the outcomes in respect of the status of art) and *generality* (which represents the measurement of the applicability of the project outcomes to a wider domain); on this purpose, adopting a range 0-3 for each of these parameters we decided to select the items beyond the threshold of '2' for both the indicators to select the most promising in terms of

relationship with standardisation. It is opportune to underline that, in this step different methods of selection with different thresholds could be selected according with the objective of the work and the domain of application of the methodology.

3. **collection of existing standards or running standardisation initiatives** from different standardisation bodies in order to select the relevant ones with reference to each of the sub-domains defined by the grid;
4. **matching between promising project outcomes and standardisation initiatives and policies** in order to understand if they could become or contribute to a new standard, provide inputs to existing standards or simply represent a request for new standards;
5. **sharing of the conclusion with project and standardisation stakeholders** in order to agree on potential development and possible actions.

The aim of such approach is to systematically identify the potential synergies between the standardisation world and the project despite a) the complexity of the project activities and outcomes, b) the absence of experts with a strong background on both worlds in the same person. The methodology facilitates different experts to combine their respective expertises and visions to tackle the problem in a structured way.

5. COIN and standardisation:

5.1. Choosing a classification grid to structure the domain (step1)

5.1.1 Structuring the domain

In order to apply the defined methodology to the COIN case a first problem is to define a classification structure of the domain of the standards that could be related to eBusiness, Interoperability and more specifically to the results of the COIN IP project (like, in example, ISU services).

An help to choose the better way to describe the COIN outcomes domains comes from E. Folmer and J. Verhoosel in 'State of art on semantic Information Systems Standardisation, interoperability and quality'⁸⁰ that offers an overview of the IT standardisation from different points of view.

A possible approach from literature is to assume a classification of the standards, like that proposed by K.Blind⁸¹ with a **taxonomy of standards for services** that defines five macro categories:

- Service management (quality management, environmental management, health and safety management)
- Service employee (qualifications and skills, further education, ergonomics)
- Service delivery (classification of services, service description, equipment supporting service delivery, service process, customer satisfaction)
- Customer interaction (customer satisfaction, evaluation of services by customers, code of conduct, customer and consumer information, accessibility, code of conduct, organisational models, information systems)
- Data flows and security (data flows formats and data security both for internal interaction and customer interaction)

Its extension is a **taxonomy for standards for eBusiness**:

- Standards for service organisations (environmental management, health and safety management)
- Customer interaction (qualifications and skills, customer satisfaction, evaluation of services by customers, code of conduct, customer and consumer information, accessibility, code of conduct, organisational models, information systems, further education)
- Service delivery (quality management)
- Data flows and information systems (ergonomics, data flows formats for internal interaction and customer interaction, information systems)
- Data security (data security for internal interaction and customer interaction, data flows formats for internal interaction)

⁸⁰ Folmer E., Verhoosel J., 'State of art on semantic Information Systems Standardisation, interoperability and quality', ISBN 978-90-9026030-3

⁸¹ K. Blind, "A Taxonomy of Service Standards and a Modification for E-Business", in "Information Communication Technology Standardization for E-Business Sectors: Integrating Supply and Demand Factors", edited by Kai Jakobs, Information Science Reference, 2009, ISBN 1605663204

Adopting this approach the COIN results appear difficult to be segmented in meaningful sub-domains because they result concentrated on the 'data security' and 'data flows' sub-domains.

A second possible approach is to try to classify the domain of interaction between the world of standards and the COIN outcomes assuming as classification criteria the **levels of interoperability**.

As a first approach the three **levels of interoperability** according to the European Interoperability Framework (EIF 1.0, 2004⁸²) are defined as:

- Technical (technical issues of linking computer systems and services),
- Semantic (content and meaning of exchanged information)
- Organisational (interpretation, processing, apply of exchanged information)

A fourth level, the **legal** level, was successively introduced (EIF 2.0, 2010⁸³) but it does not add contribution to the goal of a classification on the domain of COIN results.

A similar, more articulated, view comes from various authors (for example Euzenat, 2001⁸⁴ considers five levels of interoperability: Encoding, Lexical, Syntactic, Semantic, Semiotic); Panetto, 2007⁸⁵ analyses, among the others, levels of interoperability related to the interoperability process of the systems and organisations); here we report the proposed four levels of interoperability of Kubicek & Cimander⁸⁶.

Technical	Technically secure data transfer	Signals	Protocols of data transfer
Syntactical	Processing of received data	Data	Standardized data exchange formats (e.g.XML)
Semantic	Processing and interpretation of received data	Information	Common directories, data keys, ontologies
Organisational	Automatic linkage of processes among different systems	Processes (workflow)	Architectural models, standardised process elements (e.g.SOA with WSDL, BPML)

The four levels of interoperability from Kubicek & Cimander

⁸² EIF 1.0, "European Interoperability Framework for pan-European eGovernment Services" IDABC project, 2004, Belgium, ISBN 92-894-8389-X, ec.europa.eu/idabc/servlets/Docd552.pdf?id=19529

⁸³ EIF 2.0, "Annex II - EIF (European Interoperability Framework)" of the Communication "Towards interoperability for European public services" on the 16th of December 2010, European Commission, 2010

⁸⁴ Euzenat J., "Towards a principled approach to semantic interoperability", CEUR Proceedings of the IJCAI-01 Workshop on Ontologies and Information Sharing, Seattle, USA, August 4-5, 2001, ISSN 1613-0073, Vol. 47., 19-25, <http://sunsite.informatik.rwth-aachen.de/Publications/CEUR-WS/Vol-47/>

⁸⁵ Panetto H. (2007). *Towards a Classification Framework for Interoperability of Enterprise Applications*. International Journal of CIM, Taylor & Francis, ISSN: 0951-192X, <http://www.tandf.co.uk/journals>

⁸⁶ Kubicek H., Cimander R., "Three dimensions of organizational interoperability", European Journal of ePractice, (6 January 2009), <http://www.epractice.eu/files/6.1.pdf>

A third approach, arising from the need to identify the building elements of **an Interoperability Framework**, was proposed by Jian and Zhao⁸⁷ and has been tested on the purpose to related standards and their role in the framework, thus more detailed and fitting the standardisation bricks of the interoperability construction:

COMMON SEMANTICS	Insurance (ACORD)	Human Resource (HR-XML)	...	Healthcare (HL7)
	Horizontal Language (ebXML)			
COMMON SYNTAX (XML)				
COMMON MESSAGING MECHANISM (WEB SERVICES)	Service Composition (BPEL4WS)			
	Service Discovery (UDDI)			
	Service Description (WSDL)			
	XML Messaging (SOAP)			
COMMON COMMUNICATION MECHANISM (INTERNET)	Transport (HTTP, SMTP, FTP, BEEP)			
	Networking (TCP/IP)			

An Infrastructure for Application Interoperability Based on Web Services Technology, from Jian and Zhao

Thus it appears reasonable to assume this as a Reference Schema to identify areas of overlapping or of contact between standardisation or existing standards and the COIN outcomes.

5.1.2 The proposed classification GRID

Finally, for the purpose of this document we propose to adopt an hybrid schema for a **GRID** by considering aspects related to organisational aspects and the needs for customisation of common languages (like the case of UBL and related specialisations⁸⁸):

⁸⁷ Hemant Jain, Huimin Zhao, "A CONCEPTUAL MODEL FOR COMPARATIVE ANALYSIS OF STANDARDIZATION OF VERTICAL INDUSTRY LANGUAGES", MISQ Special Issue Workshop "Standard Making: A Critical Research Frontier for Information Systems" (2003)

⁸⁸ A. Brutti, V. Cerminara, S. Cristiani, P. De Sabbata, N. Gessa, "Use Profile Management for B2B Standard Adoption: The Case of eBIZ-TCF", in proceedings of e-Challenges 2009 conference, Istanbul, Turkey, October 21-23 2009, edited by Paul Cunningham and Miriam Cunningham, IIMC International Information Management Corporation LTD, Dublin, Ireland, IOS PRESS, ISBN 978-1-905824-13-7.

The GRID is adopted to structure the domain of interoperability standards and to discover relationships between standardised specifications and COIN results.

The first column identifies the three different '*levels of interoperability*' (identified by EIF 1.0): organizational, semantic and technical.

The second column identifies the categories of artifacts that are '*enablers*' for each 'interoperability level':

- **Technical interoperability:** the enablers are related to technologies for communication, messaging mechanisms and syntax for artifacts building.
- **Semantics interoperability:** there are three types of enablers corresponding to different groups of standardized specifications: "*Semantic description languages*", "*Horizontal information representation and exchange specifications*" and "*Vertical information representation and exchange specifications*"; it is to be observed that the first group is often the support for the others (for example Schematron is used for defining UBL profiles), and, the same could be for the second one supporting '*profile based specifications*'.
The groups resulting from this categorization are relatively homogeneous for quality of the semantic content, skills necessary for their developments, standardization organizations or consortia in charge for their development, dependency on the applicative domain.
- **Organisational interoperability:** there are two groups of enablers, "*Domain independent collaboration description languages*" and "*Domain related specifications*" that can use specifications from the first ones to express the specifications.

The third column reports samples of standardized specifications belonging to each of these groups (when using the grid the status of consolidated specification and on-going initiative will be highlighted).

The fourth column reports outcomes of the project having a possible relationship with the standardisation belonging to the same subdomain and has to be filled by the project in two steps:

- Firstly identify the results or the '*new*' know-how produced by the project related to the types of enablers (the samples can offer some guidance); see examples in the table.
- Secondly identify, if possible, the relationship between the result and the group of standards, in particular:
 - the result '*could **contribute** to further development of an existing specification*', see example 1 in the table
 - the result '*could become the basis for a **new specification***'; see example 3 in the table
 - the result '*could **benefit** from a (lacking or existing) specification*'
 - the result '*has been hampered by the lack of a specification*'
 - the result '*could contribute to the **adoption** of a specification*'
 - or simply '*could be related to*'; see example 2 in the table

Interoperability level	Enablers	Specifications (samples)	Relationship with COIN outcomes
ORGANISATION	Domain related specifications	Insurance: ACORD <ul style="list-style-type: none"> Textile Clothing Footwear reference: eBIZ-TCF processes Public Procurement reference: WS-BII processes 	
	Domain independent specifications to achieve collaborations and retrieve resources	<ul style="list-style-type: none"> WSBPEL Business process description (ebXML ebBP, BPMN...) Collaboration description (BPEL) Collaboration Protocol Agreement (ebXML CPA,...), Web Services MakeConnection BCM, ebXML (Registry), Collaboration Protocol Profile (ebXML CPP,...), UDDI, SPML, WSDM-MUWS e WSDM-MOWS, WS-Discovery, WS-Federation, WSRF, WS-BusinessActivity, WS-Coordination 	<i>Example 1: "D5-3 Enterprise Semantic Profiling" could contribute to improve ebXML CPP specification for enterprise profiling</i>
SEMANTICS (Data models, Dictionaries, Ontologies,...)	Vertical information representation and exchange specifications (per sector or per domain)	Native: <ul style="list-style-type: none"> Insurance: ACORD Health care: HL7, LOINC 	
		Profile Based: <ul style="list-style-type: none"> Textile clothing Footwear: UBL profile for eBIZ-TCF (sector based) Public Procurement: UBL profile for WS-BII (domain based) 	<i>Example 2: "Data Payload Interoperability Service" could be RELATED to this group</i>
	Horizontal information representation and exchange specifications (to be specialised)	UBL, WORDNET, ..	
	Semantic description languages	RDF, OWL, SCHEMATRON, CAM, XRD, WS-Context, WS-SecurityPolicy, XLIFF	<i>Example 3: "D5.2 - Innovative Services for Semantic Reconciliation" are basis for a new specification for mapping between formats</i>
TECHNICAL	MESSAGING MECHANISM (WEB SERVICES)	Service Composition (WSBPEL,...)	
		Service Discovery (UDDI,...)	
		Service Description (WSDL,...)	
		XML Messaging (SOAP, REST, ebMS, WS-Transaction, WS-AtomicTransaction, WS-Trust, WSN, WS-ReliableMessaging, WS-ReliableMessaging Policy, WS-Security, WS-SecureConversation ...)	
	SYNTAX	XML Technologies (XML, XSD, ...)	
	COMMUNICATION MECHANISM (INTERNET)	Transport (HTTP, SMTP, FTP, BEEP,...)	
Networking (TCP/IP)			

Elaboration produced by COIN from an Infrastructure for Application Interoperability Based on Web Services Technology, proposed by Jian and Zhao and from EIF levels of interoperability.

5.2 Analysis and selection of potentially relevant project outcomes (step 2)

In order to perform the second step (analysis and selection of project outcomes) it was necessary to select the project outcomes that have the higher potential towards standardisation.

On this purpose, firstly, the project outcomes were splitted into an high number of 'atomic' results in order to select the most potentially promising ones.

Secondly, as already explained, it was necessary to define a criteria to discard a number of these 'atomic' results. The evaluation took into account two factors: *innovation* (which represents the degree of innovation of the outcomes in respect of the status of art) and *generality* (which represents the measurement of the applicability of the project outcomes to a wider domain).

Result	Innovativity (0-3) ⁸⁹	Generality (0-3)
1. Baseline EC Services group		
a. "Member registration and profiling" Management of member information and member performance profiling (processes, VCOR ⁹⁰ Key Performance Indicator's) for both individuals and organizations.		
<u>Potential relationship to standardisation:</u> are the member's profiles expressed according to VCOR reference model? In this case, have been defined use profiles of VCOR? In this case could they become an improvement for VCOR? <u>Grid subdomain:</u> ORGANISATION --> Domain independent specifications to achieve collaborations and retrieve resources	1	2
b. "Business Opportunity characterization" - Characterization of a Business Opportunity in terms of BOM (Bill Of Material) definition, BOM item information tasks and required competencies to perform them. BO formalization in a structure (WBS).		
<u>Potential relationship to standardisation:</u> could the Coin's BOM (Bill Of Material) model the starting point for a standardised model? <u>Grid subdomain:</u> SEMANTIC --> Horizontal information representation and exchange specifications	1	2
...etc etc..	..etc..	

Sample fragment of the table of project results selection.

Thus the adopted approach was to identify with a very small granularity the project outcomes (a model, an interface, an ontology, a protocol...) and to try to assign to each item a score regarding 'innovation' and 'generality': adopting a range 0-3 for each of these parameters we decided to select the items beyond the

⁸⁹ Degree of Innovativity or Generality: 0= none, 1=low; 2=medium; 3=high;
Innovativity is the degree of innovativity of the project outcomes in respect of the status of art;
Generality is the measure of the applicability of the project outcomes to a wider domain.

⁹⁰ <http://www.value-chain.org/en/cms/3/>

threshold of '2' for both the indicators to select the most promising in terms of relationship with standardisation.

To collect and document such evaluations a table was defined to list the 'atomic' results, their description, their potential relationships (with standardisation and with the grid sub-domains) and the assigned scores (see an example in following table).

As a result of this step a certain number of COIN outcomes were identified as 'promising' and their reference to the grid of the domain of standardisation was established.

For example, in the area of **Enterprise Collaboration services** three out of ten potential outcomes were identified, while in the **Enterprise Interoperability services** they were two out of seven . (the complete list of EC and EI services outcomes is in Annex H).

At this stage it is opportune to remember, again, that a different selection criteria could have been chosen to accomplish this step with probably different results. In the perspective of this work the choice of 'innovating' and 'general' outcomes was assumed as a reasonable criteria in the COIN domain.

According to the procedure, a number of atomic results (with an associated score) were selected and somehow related with some potential field of standardisation.

For example in the domain of EI and EC services:

<p>a. Semantic Cluster Management Services (SCMS) it is based on innovative product structure ontology.</p>
<p><u>Potential relationship to standardisation:</u> can it make improvements to existing ontologies or tools for managing product structure? <u>Grid subdomain:</u> SEMANTIC --> Vertical and horizontal information representation and exchange specifications</p>

<p>d. Service oriented text enrichment services (SOTES) Services that provide the context to any textual information, they present the basic infrastructure for many planned and future semantically enriched services. Innovation: "SOTES basic services: sentence splitting, tokenization, part of speech, entity extraction, entity resolution, co-reference resolution, anaphora resolution, topic classification, triplet extraction, semantic graph and summarisation"</p>
<p><u>Potential relationship to standardisation:</u> could it become the starting point for a standardised API for the semantic enrichment? <u>Grid subdomain:</u> SEMANTIC --> Horizontal information representation and exchange specifications</p>

<p>a. Trusted Information Sharing (TIS) Document-centric information sharing accounting. Innovative Concepts: – Dynamically changing access rights • Based on previous collaboration outcome</p>

- Based on emerging social relations
- Fine-grained sharing model
 - Define sensitivity levels within a document depending on info type (XML)
 - Share more information with closer collaboration partners (system managed)
- Actively facilitate collaborations
 - Push information to close partners (avoid spamming but stimulate interest)

Potential relationship to standardisation:

could it provide a base model for trust and accounting in “document-centric information sharing”?

Grid subdomain: ORGANISATION --> Domain independent specifications to achieve collaborations and retrieve resources

Innovative Services for Semantic Reconciliation: “The output of the mapping discovery service is then a **declarative mapping**, closed to the output of an ontology matching algorithm, but capable of capturing complex correspondences that are directly interpreted as complex mapping rules, to be used in a mediation task.”

UBL is used.

Potential relationship to standardisation:

Might be there is some kind of interest in standard creation related to Document Mapping Rules representation to be supplied to mediators? (in **Semantic Mapping Discovery Service** and **Semantic Reconciliation Rule Generation Service**)

Grid subdomain: SEMANTICS--> Horizontal information representation and exchange specifications

Innovative Services for Federated Interoperability: “The UBL document is analyzed at schema level and decomposed into several parts, each one representing a single main node of the document. For each part several possibilities of transformations exists, according to the target document format or even just uploaded by end users”

Potential relationship to standardisation:

Potentially tools supporting/facilitating the standard adoption.
Could these micro-transformation become part of standard use profiles?

Grid subdomain: SEMANTICS--> (Horizontal) information representation and exchange specifications

5.3. Standardisation issues positioned in the grid (step3)

In order to implement the **third step (collection of existing standards or running standardisation initiatives)** the activities and results of different standardisation bodies was analysed and positioned in the reference grid in order to select the most relevant ones with reference to each of the sub-domains defined by the grid.

The analysed bodies were both considered when promising for the COIN purposes and when representative of different kinds of body: for example established International and European Standardisation Organisations, like UN/CEFACT and ETSI, as well as voluntary international consortia, like OASIS and W3C, with their different point of view and internal organisations.

The 'potentially' interesting standardisation activities (both specifications and generic activities) were represented through six filled instances of the classification grid (one for each of the considered bodies, in Annex G) : they allowed to associate the standardisation initiatives to the different areas of the domain and to distinguish between established and running initiatives.

At this stage there was no specific comment or evidence besides the confirmation that a huge number of standardisation initiatives were potentially interesting.

5.4 Potential relationships between standardisation and COIN results (analytical) (step 4)

According to the procedure, within step 2 (paragraph 5.2), a number of atomic results (with an associated score) were selected and, in parallel, according to step 3 (paragraph 5.3), a number of standardization initiatives from different standardization organization were identified and classified.

The step 4 activity was related to the identification of the potential relationships between these two categories within the spaces of the structure of the grids.

The crucial point, in this step was to identify what kind of relationships could be established between the project results and the concrete initiatives of each standardization organization (running or planned or already established).

The aim, as already told, was not simply to identify potentials for new standardization but also to cover a number of different kinds of relationships (see 5.1.2):

- **contribution** to further development of an existing specification
- **basis for a new specification**
- **expected benefit** from a (lacking or existing) specification'
- **hampered by the lack** of a specification'
- **contribution to the adoption** of a specification'
- or simply 'somewhat related to' a specification

The result of this step was the a number of such relationships that had to be evaluated, in next step, according with more general considerations about EU policies, research priorities and expectations and an evaluation about the relationship between the different policies and approaches to standardisation performed by different organisations.

5.5 Final recommendations/Recommendations for possible actions (step 5)

1. An interesting point are the aspects related to 'federated services platforms' that need to find a technical specification for the interoperability requirements as well as legal, business and organisational reference framework for their future activities. CEN, being in the hearth of the European standardisation, including non technology driven fields, could be the best involved to launch a new complex and articulated standardisation initiative in this area.

2. A recommendation is to explore the reciprocal sinergies between the federated service platforms architecture of COIN and the M2M architecture promoted by ETSI in order to apply the IOS paradigms and outcomes in the context of IOT applications and services.

Other committees where a contribution could be given from the experience in the COIN infrastructure (GSP, core services) are

- activity areas CLOUD and ESI (electronic signature and infrastructures)
- industry interest groups INS (Identity and access management for Networks and Services), AFI: (Autonomic network engineering for the self-managing Future Internet) and MOI (Measurement Ontology for IP traffic)

3. A number of committees are running in OASIS and could benefit from experiences in COIM: OASIS Identity in the Cloud TC, Service Component Architecture, Web Services Category, ebXML Core (ebCore), Production Planning and Scheduling (PPS) and OASIS Semantic Execution Environment TCs.

4. In parallel several results obtained by COIN are relevant to some of the key ongoing activities of the OMG, in particular: the OMG cloud working group, middleware, cloud modeling, verticals, and the Cloud Standards Customer Council (CSCC).

Again there is a current activity on OMG Semantic Information Modeling for Federation (SIMF) that could get valuable contributions from COIN outcomes.

It is recommended that CON considers to be an active participation in the Cloud Standards Customer Council and at least the experiences of the COIN Pilots should be submitted to the BEI community as Best Practices of open cloud.

5. Potential interest is in the W3C activities of incubators deal with WebID, Federated Social Web, USDL, and Library Linked Data where COIN could offer a contribution in terms of experience.

6. A potential exploitation of baseline EI services could foresee **a support to some of the UN/CEFACT specifications** related to the coding through the model transformations and semantic reconciliation mechanisms applied to business documents, business processes and enterprise models.

7. Also activities from OGF about OCCl (Open Cloud Computing Interface) could be interested into the CLOUD related COIN outcomes.

6. Conclusions

This report aimed to perform an analysis of the potential relationships between COIN and the standardisation with an approach that consider both the aspects related to the impact of COIN towards the standards as well as, viceversa, the impact of running standardisation towards COIN follow up and exploitation.

A further aspect, related to the contribution of COIN to the adoption of standards was not considered in the main focus of the study. Nevertheless some microservices for data transformation are examples of tools contributing to fostering the adoption of a standardised specification (OASIS UBL, specifically).

Many other standards were also used in the design and development activities: they are related to all the technological aspects of communication, web service declaration, process modelling (OWL, BPMN; etc), but also to the applicative level, in the case of the pilots, documental specifications were supported to run the pilots (like UBL,).

The report evidences, in the opinion of the authors, that COIN vision and its wide spectrum of research outcomes show a large potential of possible impacts towards the world of standardisation: the variety and the number of committees and initiatives that could benefit of such experience witnesses the relevance of such potential impact.

In particular the 'ongoing' initiatives that have been identified represent a first opportunity to check the interest and the potential without establishing a completely new, and risky, initiative.

The complexity of the integrated project activities demanded for a clear and well formalised methodology to perform such an analysis; this has been tackled as an opportunity for the team to setup an original and precious method of working: we expect that such approach could be replicated (an improved) in other domains and with others research projects; the methodology aimed to be able to manage a complexity of results but also to assume different perspectives, not only technological, in its evaluations.

The main open issue of the report, and of the underlying methodological aspects, is related to the difficulties arising from the mis-alignments between the project life cycle and the standardisation time scales: standardisation initiatives and actions begin at the end of the project life cycle and when only the project follow up activities are really in place.

ANNEX A: A detailed list of COIN results

A.1 Enterprise Collaboration (EC) Expected Results

The **COIN EC services** aim at supporting industrial enterprises (and SMEs in particular) in the collaborative processes regarding the creation and management of long-lasting clusters and networks (e.g. supply chains, collaborative networks, business ecosystems), as well as the creation, management and dissolution of short-term enterprises aggregations, called Virtual Enterprises or Virtual Organizations.

The EC services are divided into 4 distinct classes, each of them addressing the challenge of competencies and business opportunities dynamic management for different collaboration forms (hierarchical, semi-hierarchical and not-hierarchical):

1. the **Baseline EC Services** are supporting the collaboration life cycle both for long-term, mission-driven and for short-term, opportunity-driven aggregations;
2. the **c-PD EC Services** (Collaborative Product Development) cover the collaborative new product/service development stage, by focusing on enterprise applications where open innovation and user participation play a very important role;
3. the **c-PP EC Services** (Production Planning) cover the collaborative goods production planning stage, by focusing on enterprise applications where focus is on real time inventory management, optimized dynamic planning and scheduling and integration with manufacturing and ERP legacy systems;
4. the **c-PM EC Services** (Collaborative Project Management) cover the collaborative and participative project management, by focusing on dynamic performance indicators and proactive events management.

Key Concepts:

SMEs, supply chains, collaborative networks, business ecosystems, enterprises aggregations, Virtual Enterprises, Virtual Organizations,

EC (Enterprise Collaboration) Services, mission-driven, opportunity-driven,

c-PD (collaborative Product Development) Services, user participation,

c-PP (collaborative Production Planning) Services, dynamic planning and scheduling, integration with ERP legacy systems;

c-PM (Collaborative Project Management) Services, dynamic performance indicators, proactive events management.

A.2 Enterprise Interoperability (EI) Expected Results

The COIN EI services aim at supporting the elimination or reduction of the incompatibilities among enterprise systems involved in a collaboration scenario (being it long- or short-term). Such interoperability gaps to be removed are in general at the level of organizational structures, business processes, enterprise applications/services and data formats/content, while EI services use model transformations and semantic reconciliation techniques to solve them according to the integrated, unified and federated interoperability form.

The EI services are divided into 4 distinct classes, each of them addressing one aspect of the interoperability challenges:

1. the **Baseline EI Services** are supporting model transformations and semantic reconciliation mechanisms applied to business documents, business processes and enterprise models, according mainly to the integrated and unified form;
2. the **Information EI Services** cover the case of multiple actors involved in the collaboration and encompass publish/subscribe/negotiate mechanism for solving the interoperability gaps at data level;
3. the **Knowledge EI Services** cover the semantic representation of Enterprise competencies and the need for alignment, harmonization and interoperability of enterprises semantic profiles involved in a collaboration;
4. the **Business EI services** cover the high-level generation and the relevant model transformations necessary to create an executable collaborative business process among actors exposing external views of their internal processes.

Key Concepts:

EI (Enterprise Interoperability) services, model transformations, semantic reconciliation, federation,

Information EI Services, multiactors, negotiation,

Knowledge EI Services, semantic, profiles,

Business EI services, model transformations, business process, external view of internal processes

A.3 Generic Service Platform Expected Results

The COIN generic service platform (GSP) is the backbone of the COIN project integrating services for enterprise collaboration and enterprise interoperability. It fulfils the first main objective of COIN that is to design and develop a pervasive, adaptive service platform to host Baseline and Innovative COIN services for EI and EC and make them available under innovative on-demand, utility-oriented business models to European enterprise for running their business in a secure, reliable and efficient way.

It features several basic services that can be classified following the following four different categories of results:

1. the **SESA (Semantically Enabled Service Architecture) GSP core services**, which are able to search, discovery, rank, compose, configure and execute semantically described web and business services;
2. the **P2P Repository Management GSP core services**, which are responsible for persistence and retrieval of various GSP-related artifacts. They represent a robust, fail-safe implementation of the GSP Model Repository and the Service Registry;
3. the **Security Management GSP core services**, which implement the authentication, authorization and accounting services as well as the data protection and privacy preserving policies for the GSP;
4. the **Intelligent Composition GSP core services**, which, thanks to a multi-agent and knowledge-based architecture, are able to implement the negotiation process for a business-driven service selection and composition of the GSP.

Key Concepts:

Generic Service Platform (GSP), Platforms Federation, pervasive and adaptive service platform,

SESA (Semantically Enabled Service Architecture) GSP core services, to search services, to discovery services, to rank services, to compose services, to configure services, to execute services, web services, business services, semantic description,

P2P Repository Management GSP core services, retrieval artifacts, repository, registry,

Security Management GSP core services, authentication services, authorization services, accounting services, data protection, privacy preserving policies,

Intelligent Composition GSP core services, multi-agent, knowledge-based, negotiation process, business-driven service selection, composition of the GSP

A.4 SaaS-U Business Models Expected Results

One of the most important objectives of COIN is to study and research a new business paradigm, the SaaS-U, which is intended as a specification and substantiation of the ISU (Interoperability Service Utility) Grand Challenge of the EI Research Roadmap, positioned especially in respect of delivery of IT functions as services (Software as a Service - SaaS) as envisioned in the Roadmap. Within COIN, SaaS-U will be addressing new business strategies and models, in complement to the technical RTD of the COIN ICT service platforms and services.

According to the ISU paradigm, interoperability will be a utility-like capability for enterprises, a capability that is available at (very) low cost, accessible in principle by all enterprises (universal or near-universal access), "guaranteed" to a certain extent and at a certain level in accordance with a set of common rules, not controlled or owned by any single private entity.

COIN studied the conditions under which such a paradigm could succeed in delivering IT services to European industry and will depict some possible business models where all the stakeholders (e.g. from IT

domain both platform and service providers; from Industry domain both decision makers and final users) are expected to play an important role.

Key Concepts:

SaaS-U (Software as a Service-Utility), ISU (Interoperability Service Utility), universal or near-universal access, common rules not owned by private entity, business models

A.5 Business Maturity Models Expected Results

An Enterprise Collaboration Maturity Model (ECMM) is developed to support the best adoption and take-up of COIN outcomes into target industrial environments, by carefully modelling and analysing the enterprise readiness for collaboration and interoperability and by suggesting the proper measures for improvement.

The ECMM has as main objective to analyze, measure, and propose improvement practices for increasing the capability of an organization to be able to collaborate and interoperate. That is, both interoperability and collaboration aspects should be included to reach a model that takes into account Enterprise Interoperability and Enterprise Collaboration as the two sides of the same COIN.

Key Concepts:

Enterprise Collaboration Maturity Model, analysing the enterprise, interoperability improvement, increasing capability to collaborate, increasing capability to interoperate.

ANNEX B: CEN ongoing activities

List of CEN Technical Committees on ICT

- CEN/TC 224 Personal Identification, Electronic Signature and Cards. Organizes, coordinates and monitors the development of standards (including testing standards) for cards, related device interfaces and operations with special emphasis on inter-industry standardization and on Integrated Circuit Cards, without restriction to payment cards or bank cards.
- CEN/TC 247 Building Automation, Controls and Building Management. Standardizes individual and combination devices and systems for automatic control of mechanical building service installations, in particular, for heating, ventilating and air-conditioning systems.
- CEN/TC 251 Health Informatics. Organizes, coordinates and monitors the development of standards, including testing standards in healthcare informatics, as well as the promulgation of these standards. It also deals with the European Commission's Mandate 403 on ehealth interoperability. For this latter, a dedicated web site is maintained by NEN ([link](#)). Work on the mandate is currently on hold waiting for European funding.
- CEN/TC 278 Road transport and traffic telematics. Works with standardization in the telematics field applied to road traffic and transport, including those elements that need technical harmonization for intermodal operation with other means of transport. It supports activities such as vehicle, container, swap body and goods wagon identification; communication between vehicles and road infrastructure; traffic and parking management, user fee collection, public transport management and user information.
- CEN/TC 287 Geographic Information. Produces a structured framework of standards and guidelines, which specify a methodology to define, describe and transfer geographic data and services. This work is carried out in close cooperation with ISO/TC 211 in order to avoid duplication of work. The standards support the consistent use of geographic information throughout Europe in a manner that is compatible with international usage. They support a spatial data infrastructure at all levels in Europe.
- CEN/TC 290 Dimensional and Geometrical Product Specification and Verification. Standardization in the field of macro and micro-geometry specification including dimensional and geometrical tolerancing, surface properties and the related verification principles, measuring equipment and calibration requirements.
- CEN/TC 304 Information and Communication Technologies - European Localization Requirements. Standardization in the field of Information and Communications Technologies, to ensure that European localization requirements can be satisfied. Localization in this context means the provision of software and hardware support adapted to local linguistic and cultural needs in Europe.
- CEN/TC 310 Advanced Automation Technologies and their Applications. Ensures the availability of standards required by industry for the integration of elements of Advanced Manufacturing

Technologies (AMT) systems. Standards are required in areas such as enterprise modeling and system architecture, communication, data, information processing, control equipment, human aspects, mechanical aspects and system operational aspects.

- CEN/TC 353 Information and Communication Technologies for Learning, Education and Training. Produces standards in the field of information and communication technologies relating to learning, education and training. The Technical Committee focuses on standards for vocabularies and frameworks, quality and competencies. This work is carried out in close cooperation with the CEN Workshop on Learning Technologies (WS/LT).
- CEN/TC Project Committee 365 - Internet Filtering. This Project Committee is currently developing standards on Internet Content and Communications Filtering Software and Services.

List of CEN Workshops on ICT

Banking software:

- Extensions for financial services, Java platform (WS/J-XFS),
- Extensions for financial services, Microsoft platform (WS/XFS)

Generic approaches to facilitate business transactions:

- eBusiness European Standardization, EDI and ebXML (WS/eBES)
- Global eBusiness Interoperability Testbed methodologies (WS/GITB)

Helping specific applications or specific sectors

- Business Interoperability Interfaces for public procurement in Europe (WS/BII)
- eInvoicing 3 (WS/eInv3)
- Economics and logistics of standards compliant schemas and ontologies for interoperability - Engineering Material Data' (WS/ELSSI-EMD)
- Multilingual electronic cataloguing and classification in eBusiness (WS/eCAT)
- Integration of standards for traceability and sale of fish products (WS/FishBizz)

Skills and eLearning

- ICT Skills (WS/ICT-Skills)
- Learning Technologies (WS/LT)

Public interest

- Data Protection and Privacy (WS/DPP) - second phase

Intelligent transport

- Smart Container Management (Smart CM)
- EGNOS/EDAS based services for tracking & tracing of the transport of goods (SCUTUM)

ANNEX C: OASIS ongoing initiatives

The Technical Committees producing ongoing initiatives (specifications becoming OASIS standard) inherent to COIN project are listed and grouped in: Organisation, Semantic, Technical.

Organisation Section

- - Privacy Category
 - OASIS Identity Metasystem Interoperability (IMI) TC
 - OASIS Privacy Management Reference Model (PMRM) TC
 - OASIS Provisioning Services TC
 - OASIS Identity in the Cloud TC
- - Cloud Category
 - OASIS Identity in the Cloud TC
 - OASIS Transformational Government Framework TC
- - SOA Category
 - OASIS Service Component Architecture / Policy (SCA-Policy) TC
 - OASIS Service Component Architecture / Assembly (SCA-Assembly) TC
 - OASIS Service Component Architecture / Bindings (SCA-Bindings) TC
 - OASIS SOA Repository Artifact Model and Protocol (S-RAMP) TC
 - OASIS Service Component Architecture / BPEL (SCA-BPEL) TC
 - OASIS Service-Oriented Architecture End-to-End Resource Planning (SOA-EERP) TC
- - Web Services Category
 - OASIS Web Services Calendar (WS-Calendar) TC
 - OASIS Web Services Quality Model TC
 - OASIS Search Web Services TC
 - OASIS Web Services Discovery and Web Services Devices Profile (WS-DD) TC
 - OASIS WS-BPEL Extension for People (BPEL4People) TC
- e-Commerce Category
 - OASIS Customer Information Quality (CIQ) TC
 - OASIS ebXML Core (ebCore) TC
- - Supply Chain Category
 - OASIS Production Planning and Scheduling (PPS) TC
 - OASIS Product Life Cycle Support (PLCS) TC

Semantic Section

- - e-Commerce Category
 - OASIS Semantic Execution Environment TC

Technical Section

- - SOA Category
 - OASIS Service Component Architecture / J (SCA-J) TC
- - Web Services Category
 - OASIS Web Services Security Maintenance (WSS-M) TC
- - Conformance Category
 - OASIS Test Assertions Guidelines (TAG) TC
 - OASIS Testing and Monitoring Internet Exchanges (TaMIE) TC

ANNEX D: OMG in detail

D.1 CSCC Initiative

The Cloud Standards Customer Council (CSCC) is an end user advocacy group dedicated to accelerating cloud's successful adoption, and drilling down into the standards, security and interoperability issues surrounding the transition to the cloud. The Council is not a standards organization, but will complement existing cloud standards efforts and establish a core set of client-driven requirements to ensure cloud users will have the same freedom of choice, flexibility, and openness they have with traditional IT environments. The Cloud Standards Customer Council is open to all end-user organizations. CA Technologies, IBM, Kaavo, Rackspace and Software AG are Founding Sponsors.

The Cloud Standards Customer Council is formed as a group under the Object Management Group, a nonprofit trade association as set out in section 501(c)(6) of the US Internal Revenue Code⁹¹.

CSCC Mission

The Cloud Standards Customer Council's mission, strategies, and tactics center on the following premises:

- Cloud computing adoption is a key enabler for the 21st century enterprise
- Achieving the benefits of cloud computing requires significant changes for both IT and business executives
- Cloud computing is perceived by business executives as an IT integration and productivity story, rather than a business agility story
- Cloud computing practitioners would greatly benefit from a vibrant practitioner community to drive local, business-driven, cloud success, and to spur broader enterprise, and industry-wide, cloud adoption.

CSCC Approach

Extract from the "Open Cloud Manifesto: "Dedicated to the belief that the cloud should be open"⁹²

Principles of an Open Cloud

1. Cloud providers must work together to ensure that the challenges to cloud adoption (security, integration, portability, interoperability, governance/management, metering/monitoring) are addressed through open collaboration and the appropriate use of standards.

⁹¹ <http://www.cloud-council.org>

⁹² www.opencloudmanifesto.org

2. Cloud providers must not use their market position to lock customers into their particular platforms and limit their choice of providers.

3. Cloud providers must use and adopt existing standards wherever appropriate.

The IT industry has invested heavily in existing standards and standards organizations; there is no need to duplicate or reinvent them.

4. When new standards (or adjustments to existing standards) are needed, we must be judicious and pragmatic to avoid creating too many standards. We must ensure that standards promote innovation and do not inhibit it.

5. Any community effort around the open cloud should be driven by customer needs, not merely the technical needs of cloud providers, and should be tested or verified against real customer requirements.

6. Cloud computing standards organizations, advocacy groups, and communities should work together and stay coordinated, making sure that efforts do not conflict or overlap.

CSCC Working Groups

CSCC is structured in the following working groups:

- Business Patterns in the Cloud
- Cloud Interoperability
- Education
- Financial Services
- Government
- Healthcare
- IaaS: Evolution from infrastructure to workload management
- Legal
- Media
- PaaS: Landscape and boundary
- Practical Guide to Cloud Computing Working Group
- Reference Architecture
- Retail
- SaaS: Industry Vertical (Retail, Finance, Telco)
- Social Business Standards for Cloud
- Telecommunication

CSCC Steering Committee

The Cloud Standards Customer Council Steering Committee has twelve (12) elected members, each of whom is affiliated with a Cloud Standards Customer Council member.

Members have up to three-year terms. Each year, four (4) seats are due for re-election. There are one, two and three year terms that members are eligible to run for and there are four seats for each that are due for re-election annually.

Cloud Standards Customer Council (CSCC) members elected a Steering Committee, announced the publication of a library of cloud use cases, established working groups and have appointed Andrew Watson, vice president, OMG as liaison officer to standards development organizations (SDOs) at their first quarterly meeting held on Tuesday, June 21 in Salt Lake City, UT.

CSCC members have elected a Steering Committee, which will provide overall management of CSCC, set priorities and directions, approve working groups and vote on white papers and other deliverables that come from CSCC. Melvin Greer, Senior Fellow and Chief Strategist, Cloud Computing, Lockheed Martin who had been acting as interim chair, was elected as chair of CSCC steering committee. Initial members include AGECC, CloudOne, Cutter Consortium, IBM, Itron, Kaavo, Lockheed Martin, Servoy, Software AG, SurePass, Symantec, and Wohl Associates. Additional nominations are still being received to complete the Steering Committee.

CSCC Relationships with other standard bodies.

At the Cloud Standards Customer Council (CSCC⁹³) meeting on June 21 in Salt Lake City, UT, several cloud standards development organizations (SDOs) including Distributed Management Task Force (DMTF), OASIS, Open Grid Forum (OGF) OMG®, Storage Networking Industry Association (SNIA), and The Open Group presented overviews of their cloud standards work to members. TM Forum will be giving their cloud standards presentation to the members at the next virtual meeting to be held on July 20. CSCC also announced that Andrew Watson, vice president, OMG, has been appointed as CSCC Liaison Officer to the SDOs. The SDOs have been invited to work with CSCC to help drive customer requirements and priorities for cloud computing into their standards development processes. The broad recognition and support of CSCC by standards organizations [see quote sheet] makes it possible to focus the important efforts of those organizations on requirements and priorities of cloud computing customer organizations.

Standards Development Organizations Liaisons: <http://www.cloudstandardscustomerCouncil.org/sdol/>

⁹³ <http://www.cloud-council.org>

D.2 Details about potential interest of COIN for CSCC initiative

The results produced by COIN in the area of Enterprise Interoperability (EI) and Generic Service Platform (GSP) are both relevant to the Cloud Standards Customer Council activities.

COIN EI services aim at supporting the elimination or reduction of the incompatibilities among enterprise systems involved in a collaboration scenario (being it long- or short-term).

In particular the following aspects of COIN EI relate to the working groups of CSCC **“Business Patterns in the Cloud”, “SaaS: Industry Vertical (Retail, Finance, Telco)”**

- 1.. **COIN Baseline EI Services** - supporting model transformations and semantic reconciliation mechanisms applied to business documents, business processes and enterprise models, according mainly to the integrated and unified form.
- 2.. **COIN Information EI Services** -. multiple actors involved in the collaboration and encompass publish/subscribe/negotiate mechanism for solving the interoperability gaps at data level.
- 3.. **COIN Knowledge EI Services** - semantic representation of Enterprise competencies and the need for alignment, harmonization and interoperability of enterprises semantic profiles involved in a collaboration.
- 4.. **COIN Business EI services** - high-level generation and the relevant model transformations necessary to create an executable collaborative business process among actors exposing external views of their internal processes.

COIN generic service platform (GSP) is the backbone of the COIN project integrating services for enterprise collaboration and enterprise interoperability. GSP enables to design and develop a pervasive, adaptive service platform to host baseline and innovative COIN services for EI and EC and make them available under innovative on-demand, utility-oriented business models to enterprises. In this context **Cloud technology** plays a key role.

In particular COIN’s results relates to the following working group of the **Cloud Standards Customer Council (CSCC)**:

- 1.. **COIN: SESA (Semantically Enabled Service Architecture) GSP core services**, - search, discovery, rank, compose, configure and execute semantically described web and business services; **relates to “Business Patterns in the Cloud”, “IaaS: Evolution from infrastructure to workload management”**.
- 2.. **COIN: P2P Repository Management GSP core services**, which are responsible for persistence and retrieval of various GSP-related artifacts. They represent a robust, fail-safe implementation of the GSP Model Repository and the Service Registry, **relates to “Reference Architecture”, “Cloud Interoperability”**
- 3.. **COIN: Security Management GSP core services**, which implement the authentication, authorization and accounting services as well as the data protection and privacy preserving policies for the GSP; **relates to “Reference Architecture”, “Business Patterns in the Cloud”,**
- 4.. **COIN: Intelligent Composition GSP core services**, which, thanks to a multi-agent and knowledge-based architecture, are able to implement the negotiation process for a business-driven service selection and

composition of the GSP. relates to “**Reference Architecture**”, “**Business Patterns in the Cloud**”, “**SaaS: Industry Vertical (Retail, Finance, Telco)**”, “**PaaS: Landscape and boundary**”.

D.3 Details about potential interest of COIN for OMG Technology driven standards

COIN results are relevant to the following current standardization activities of the OMG on cloud, *cloud working group* middleware, cloud modeling, verticals.

In particular the following OMG **groups** are potentially relevant to COIN:

- Business Modeling and Integration DTF (Government DTF)
- Super Distributed Objects DSIG (Finance DTF)
- Regulatory Compliance DSIG (Healthcare DTF)
- Software-Based Communications DTF (C4I DTF)
- Manufacturing Technology & Industrial Systems DTF
- Analysis and Design PTF (Agent PSIG)
- Architecture-Driven Modernisation PTF (Japan PSIG)
- Middleware and Related Services PTF (Korea PSIG)
- System Assurance PTF (Ontology PSIG)
- Data Distribution Services PSIG (Telecoms PSIG)

The following list of OMG **RFIs, RFCs, RFPs and finalization reports** (that have been discussed at the recent OMG meeting on Sep. 19-23, 2011, Kissimmee, FL USA) are potentially relevant to the results of COIN.

OMG Proposed RFP/RFC/RFI issuances:

- - OMG Semantic Information Modeling for Federation (SIMF) DRAFT RFP
- - Interaction Flow Modeling Language (IFML) DRAFT RFP
- - RIA Component Interoperability DRAFT RFP
- - Application Instrumentation DRAFT RFP
- - Information Exchange Framework (IEF) Policy Enforcement Service (PES) RFP

The following is a list of all current OMG **processes with OPEN LOI** (Letter of Intent) and Voting lists and their respective deadlines.

This is an opportunity for COIN to actively contribute to some of the OMG ongoing standardization activities. Note: Only OMG members (Trial and Analyst members excluded) are eligible to vote on RFP processes in Task Forces

- Healthcare Community Services Provider Directory RFP
- Application Programming Interfaces (API) to Knowledge Bases (KB) RFP
- Application Programming Interfaces (API) to Knowledge Bases (KB) RFP
- Asynchronous Method Invocation for CORBA Component Model RFP
- IDL to C++0x Language Mapping RFP
- Healthcare Community Services Provider Directory RFP
- UML Profile for NIEM (NIEM-UML) RFP
- Test Information Interchange RFP
- Metamodel Extension Facility RFP
- Test Information Interchange RFP
- Information Exchange Framework (IEF) Policy Vocabulary (IEPV) RFP
- UML Profile for NIEM (NIEM-UML) RFP
- Metamodel Extension Facility RFP

ANNEX E: W3C specifications interesting for COIN

Area 1: Web Design and Applications			
Theme	Interesting Specification for COIN	Description	W3C Status
HTML & CSS	No		
Audio and Video	No		
Scripting and Ajax	No		
Graphics	No		
Accessibility	Authoring Tool Accessibility Guidelines (ATAG)	Guidelines for Web authoring tool developers. Its purpose is two-fold: to assist developers in designing authoring tools that produce accessible Web content and to assist developers in creating an accessible authoring interface.	W3C Recommendation (2000)
	Authoring Tool Accessibility Guidelines (ATAG) 2.0	Guidelines for designing Web content authoring tools that are more accessible for people with disabilities.	W3C Working Draft (2011)
Inter-nationalization	Web Services Internationalization (WS-I18N)		W3C Working Draft (2008)
Mobile Web	No		
Privacy	Protocol for Web Description Resources (POWDER)	POWDER the Protocol for Web Description Resources provides a mechanism to describe and discover Web resources and helps the users to make a decision whether a given resource is of interest. POWDER consists in 3 W3C recommendations: <ul style="list-style-type: none"> - POWDER Description Resources - POWDER Formal Semantics - POWDER Grouping of Resources 	W3C Recommendation (2009)
	Platform for Privacy Preferences (P3P)	P3P enables Websites to express their privacy practices in a standard format that can be retrieved automatically and interpreted easily by user agents.	W3C Recommendation (2002)
Math on the Web	No		

Area 2: Web Architecture			
Theme	Interesting Specification for COIN	Description	W3C Status
Architecture Principles	Web Service Architecture	There are no recommendation but various W3C Group Notes (Group Notes are <i>not</i> standards and do not have the same level of W3C endorsement.)	W3C Working Group Notes (2004)
Identifiers	Web Services Addressing 1.0	Web Services Addressing provides transport-neutral mechanisms to address Web services and messages. WS-Addressing consists in 3 W3C recommendations: - WS-Addressing Metadata (2007) - WS-Addressing Core (2006) - WS-Addressing SOAP Binding (2006)	W3C Recommendation (2007)
Protocols	No		
Meta Formats	No		
Protocol and Meta Format Considerations	Accessible Rich Internet Applications (WAI-ARIA) 1.0	Accessibility of Web content to people with disabilities requires semantic information about widgets, structures, and behaviors, in order to allow Assistive Technologies to make appropriate transformations. This specification provides an ontology of roles, states, and properties that set out an abstract model for accessible interfaces and can be used to improve the accessibility and interoperability of Web Content and Applications. The result is an interoperable method for associating behaviors with document-level markup.	W3C Candidate Recommendation (2011)
Internationalization	Internazionalizati on (ALL)	There are no specifications but several W3C Working Group Notes about <i>Internazionalization</i> that may be interesting for the COIN project: - Working with Time Zones (2011) - Best Practices for XML Internationalization (2008) - Requirements for the Internationalization of Web Services (2004) - Web Services Internationalization Usage Scenarios (2004)	W3C Working Group Notes

Area 3: Semantic Web			
Theme	Interesting Specification for COIN	Description	W3C Status
Linked Data	Resource Description Framework (RDF)	<p>The Resource Description Framework (RDF) is a framework for representing information in the Web.</p> <p>RDF Concepts and Abstract Syntax defines an abstract syntax on which RDF is based, and which serves to link its concrete syntax to its formal semantics. It also includes discussion of design goals, key concepts, datatyping, character normalization and handling of URI references.</p> <p>The W3C Recommendation about RDF:</p> <ul style="list-style-type: none"> - RDF Concepts and Abstract Syntax - RDF Semantics - RDF Primer - RDF Vocabulary Description Language 1.0: RDF Schema <p>Also, we suggest a collection of Semantic Web Case Studies and Use Cases</p>	W3C Recommendation (2004)
Vocabularies	Web Ontology Language 2 (OWL 2)	<p>Ontology language for the Semantic Web with formally defined meaning. OWL 2 ontologies provide classes, properties, individuals, and data values and are stored as Semantic Web documents.</p> <p>There are several standards about:</p> <ul style="list-style-type: none"> - OWL (W3C recommendations in 2004), - OWL 2 (W3C recommendations in 2009), - OWL and RDF (W3C recommendations in 2009) and - RIF RDF and OWL (W3C recommendation 2010) 	W3C Recommendation
	Simple Knowledge Organization System Reference (SKOS)	<p>SKOS is a common data model for sharing and linking knowledge organization systems via the Web.</p>	W3C Recommendation (2009)
	Evaluation and Report Language (EARL)	<p>EARL is a standardized vocabulary to express test results. The primary motivation for developing this language is to facilitate the exchange of test results between Web accessibility evaluation tools in a vendor neutral and platform independent format.</p>	W3C Working Draft (2011)
Query	SPARQL	<p>SPARQL can be used to express queries across diverse data sources, whether the data is stored natively as RDF or viewed as RDF via middleware.</p>	W3C Recommendation (2008)
Inference	Rule Interchange Format (RIF)	<p>The RIF is a standard for exchanging rules among rule systems, in particular among Web rule engines. RIF focused on exchange rather than trying to develop a single one-fits-all rule language because, in contrast to other Semantic Web standards, such as RDF, OWL, and SPARQL. A single language would not satisfy the needs of many popular paradigms for using rules in knowledge representation and business modeling. The approach taken by the Working Group was to design a family of languages, called <i>dialects</i>, with rigorously specified syntax and semantics.</p> <p>There are 6 W3C recommendations about RIF.</p>	W3C Recommendation (2010)
Vertical Appl.	No		

Area 4: XML Technology			
Theme	Interesting Specification for COIN	Description	W3C Status
XML Essentials	No		
Schema	No		
Security	No		
Transformation	No		
Query	No		
Components	No		
Processing	No		
Inter-nationalization	No	See the W3C areas: - Area 2: Web Architecture ; - Area 5: Web of Services .	
Publishing	No		

Area 5: Web of Services			
Theme	Interesting Specification for COIN	Description	W3C Status
Protocols	No		
Service Description	Web Services Description Language (WSDL)	Web Services Description Language.	W3C Note (2001)
	Semantic Annotation for WSDL and XML Schema (SAWSDL)	The specification defines how semantic annotation is accomplished using references to semantic models, e.g. ontologies. It provides mechanisms by which concepts from the semantic models, typically defined outside the WSDL document, can be referenced from within WSDL and XML Schema components using annotations.	W3C Recommendation (2007)
	Web Services Choreography	The Web Services Choreography Description Language (WS-CDL) is an XML-based language that describes peer-to-peer collaborations of participants by defining, from a global viewpoint, their common and complementary observable behavior; where ordered message exchanges result in accomplishing a common business goal.	W3C Candidate Recommendation (2005)
	Web Services Policy	The WS-Policy Framework provides a general purpose model and corresponding syntax to describe the policies of entities in a Web services-based system.	W3C Recommendation (2007)
	Service Modeling Language (SML)	SML is used to model complex services and systems, including their structure, constraints, policies, and best practices. SML uses XML Schema and Schematron.	W3C Recommendation (2009)

	Web Services Resource Access	<p>WS Resource Access consists in 7 W3C Candidate Recommendations:</p> <ul style="list-style-type: none"> - WS-Enumeration: a general SOAP-based protocol for enumerating a sequence of XML elements from a SOAP enabled information source; - WS-Eventing: a protocol that allows Web services to subscribe to or accept subscriptions for notification messages; - WS-Transfer: a general SOAP-based protocol for accessing XML representations of Web service-based resources; - WS-MetadataExchange: this specification defines how metadata associated with a Web service endpoint can be represented as resources, how metadata can be embedded in endpoint references, how metadata could be retrieved from a metadata resource, and how metadata associated with implicit features can be advertised; - WS-Fragment: This specification extends the WS-Transfer specification to enable clients to retrieve and manipulate parts or fragments of a WS-Transfer enabled resource without needing to include the entire XML representation in a message exchange; - WS-EventDescriptions: a mechanism by which an endpoint can advertise the structure and contents of the events it might generate; - WS-SOAPAssertions: This specification defines two WS-Policy assertions that can be used to advertise the requirement to use a certain version of SOAP in message exchanges. 	W3C Candidate Recommendation (2011)
Security	No		
Inter-nationalization	Web Services Internationalization (WS-I18N)	<p>Enhancements to SOAP messaging to provide internationalized and localized operations using locale and international preferences. These mechanisms can be used to accommodate a wide variety of development models for international usage.</p> <p>The WG produced, also, 3 interesting Group Notes:</p> <ul style="list-style-type: none"> - Working with Time Zones - Legacy extended IRIs for XML resource identification - Web Services Internationalization Usage Scenarios 	W3C Working Draft (2008)

Area 6: Web of Devices			
Theme	Interesting Specification for COIN	Description	W3C Status
Mobile Web	No		
Voice Browsing	No		
Device Independence and Content	Composite Capability / Preference	A CC/PP profile is a description of device capabilities and user preferences. This is often referred to as a device's delivery context and can be used to guide the adaptation of	W3C Recommendation (2004)

Adaption	Profiles (CC/PP)	content presented to that device.	
Multimodal Acces	No?		
Web and TV	No		

Area 7: Browsers and Authoring Tools			
Theme	Interesting Specification for COIN	Description	W3C Status
Browser, Media Players	No		
Authoring tools, Social Media	Authoring Tool Accessibility Guidelines (ATAG)	Any software, or collection of software components, that authors can use to create or modify web content for use by other people, is an Authoring Tool. Authoring tools, at their best, should allow all of us to publish to a universal space of web content, read by people from all over the world, in many different languages, on many different computers, using many different input and output devices.	W3C Recommendation (2000)
	Authoring Tool Accessibility Guidelines (ATAG) 2.0	Guidelines for designing web content authoring tools that are both (1) more accessible to authors with disabilities and (2) designed to enable, support, and promote the production of accessible web content by all authors.	W3C Working Draft (2011)

ANNEX F: The COPRAS project

The COPRAS (COoperation Platform for Research And Standards, <http://www.w3.org/2004/copras/>) project was a support action of FP6 aiming to improve the interfacing, cooperation and exchange between IST (Information Society Technologies) research projects and ICT standardization. Partners of the project are the three European standardization bodies (CEN, CENELEC and ETSI), the W3C Consortium (W3C) and the Open Group (TOG)

Started in 2004, its declared mission was to "address the challenge of better synchronizing the continuous technological development in ICT with standardization processes, thus making the benefits of these technological developments better and earlier accessible to industry and society."

The crucial point in order to achieve such objective for COPRAS was to stimulate, facilitate, and ease cooperation and exchange between IT research projects and ICT standards organizations, mainly by supporting projects in establishing relationships with the relevant standards organizations; the idea is to facilitate the path, for the projects, to put in evidence their outcomes to the standardization bodies enabling them to upgrade their results through standardization, and hence stimulate their dissemination and usage.

As one of its most relevant deliverables, COPRAS in 2007 published a set of Generic Guidelines⁹⁴ facilitating interfacing between research projects and ICT standards organizations.

The approach of the guidelines could be summarized on three corner stones:

- standardization as an opportunity for IT projects to disseminate their outcomes,
- importance to identify and plan standardization since the beginning of the project activities,
- direct involvement of the project with standardization bodies.

Standardization guidelines for IST research projects interfacing with ICT standards organizations

(from COPRAS web site, <http://www.w3.org/2004/copras/docu/D15.html>)

1. [Introduction](#)
2. [Benefits of standards and standardization](#)
 1. [ICT standards, industry society what standards are and why standards are important](#)
 2. [Disseminating your projects results through standardization](#)
 3. [What does my project get out of interfacing with standards bodies](#)
 1. [Industry and service providers SME companies](#)
 2. [Academia, research institutes and professional bodies](#)
 3. [Governments and public authorities](#)
 4. [Consumers and society](#)
3. [Your project and interfacing with standards bodies](#)
 1. [Determining whether your project should plan to interface with standards bodies](#)
 2. [Identifying possibilities for cooperation with standards bodies](#)
 3. [When should my project think about standardization?](#)
 4. [Planning your projects interfacing with standards bodies](#)

⁹⁴ Standardization guidelines for IST research projects interfacing with ICT standards organizations, COPRAS project, January 2007, <http://www.w3.org/2004/copras/docu/D27.pdf>

1.	What stage to start thinking about interfacing with standardization
2.	Participate in standardization processes as a project or as a project partner
5.	Planning resources and work packages for standardization activity
6.	Continuing standardization processes beyond the scope of your projects lifespan
☐	Standardization processes
1.	General process characteristics
2.	Different organization, different approaches different results
1.	Different types of standards bodies
2.	Formal and non-formal standardization processes
3.	Different types of standardization deliverables results
3.	When and how to contact targeted standardization working groups?
☐	Selecting the standards bodies that best fit your projects needs
1.	Thematic focus area
2.	Timing
3.	Open standardization processes
4.	Geographic focus areas
5.	Confidentiality Intellectual Property
6.	Membership of standards bodies
7.	What if I cant find an organization to address my projects output
☐	Summary

Other outcomes from the guidelines:

Categories of standards (according to their purposes):

- “Fundamental standards - concerning terminology, conventions, signs and symbols, etc;
- Test methods and analysis standards - measuring characteristics such as temperature or chemical composition;
- Specification standards - defining the characteristics of a product or service and their performance thresholds, e.g. inter-changeability, health and safety, or environmental protection;
- Organization standards - describing the functions and relationships of a company, as well as elements such as quality assurance, maintenance, or production management, etc.”

Types of standardization deliverables & results

- “• Formal standards, sometimes also referred to as ‘de jure’ standards, are normative documents from formal standards bodies and have passed through a full and open consensus process. They are implemented on a national level and there is strong pressure to apply them; formal standards have a legal basis and can be made mandatory but considerable time (up to 4 years) is needed for completing the full approval process.
- Technical or industry specifications are based on consensus among members of standards bodies, consortia or trade organizations and do not have a formal character or legal basis; they are recommendations and require less time to produce (1-3 years) but when widely accepted and used in practice by relevant market players they can become ‘de facto’ standards.
- Workshop Agreements are industry recommendations developed by interested stakeholders through a short-track process (6-12 months) facilitated by several formal standards bodies; workshop agreements serve as industrial consensus documents between participating individuals and organizations, and can be revised relatively easily.
- Conformance, test applications, reference implementations and guidelines aim to support interoperability between and easy roll-out by market players of equipment and services based on formal standards or industry specifications. They have an informative character and are usually produced in a relatively short timeframe (6-12 months).

- Technical reports are informative documents supporting further standardization work, e.g. by identifying the need for additional technical clarifications”

The project presented and discussed its findings with its stakeholders (researchers, industry, government and European Commission representatives, standardization bodies) in a public event held 17 January 2007 in Brussels.

COPRAS reported⁹⁵ that the main conclusions from the conference were:

- “Standards establish a **bridge** between research results and the implementation of innovative products. Standardization is therefore an essential component for boosting innovation;
- **Timing** is essential for standardization; an early start provides better chances for being successful; moreover, the current pace of technological development forces standardization and research to proceed in parallel;
- There are still many **barriers** for projects participating in standardization such as membership fees or confidentiality rules; also more tools are needed to find the right standards organization and to determine the differences between various bodies;
- **Competition** between standards organizations forces the latter to put more effort into marketing, specifically towards the SME community;
- **Interfacing** with standardization remains an important aspect in FP7. Additional measures are needed and continuation of COPRAS’ efforts to bring European research and standardization closer together is a necessity to reinforce Europe’s position as a leading provider of technologies for the global information society.”

⁹⁵ COPRAS, *Open meeting report, 31/1/2007*, <http://www.w3.org/2004/copras/docu/D25.pdf>

ANNEX G: Standardisation issues positioned in the grid

G.1 CEN

Interoperability level	Enablers	Specifications	
ORGANISATION	Domain related specifications	Ongoing <i>CEN/TC 224 Personal Identification, Electronic Signature and Cards</i> <i>CEN/TC Project Committee 365 - Internet Filtering.</i> <i>WS/BII Business Interoperability Interfaces for public procurement in Europe</i> <i>WS/eInv3 eInvoicing 3</i> <i>WS/eCAT Multilingual electronic cataloguing and classification in eBusiness</i>	
	Domain independent specifications to achieve collaborations and retrieve resources		
SEMANTICS (Data models, Dictionaries, Ontologies, ...)	Vertical information representation and exchange specifications (per sector or per domain)	Native: Ongoing <i>CEN/TC 287 Geographic Information</i> <i>CEN/TC 290 Dimensional and Geometrical Product Specification and Verification</i> <i>CEN/TC 304 Information and Communication Technologies - European Localization Requirements</i>	
		Profile based:	
	Horizontal information representation and exchange specifications (to be specialised)		
	Semantic description languages		
TECHNICAL	MESSAGING MECHANISM (WEB SERVICES)	Service Composition	
		Service Discovery	
		Service Description	
		Messaging <i>Ongoing</i>	
	SYNTAX		
COMMUNICATION MECHANISM (INTERNET)	Transport		
	Networking:		

Note: Italic evidences 'ongoing' initiatives.

G.2 ETSI

Interoperability level	Enablers	Specifications	
ORGANISATION	Domain related specifications		
	Domain independent specifications to achieve collaborations and retrieve resources		
SEMANTICS (Data models, Dictionaries, Ontologies,...)	Vertical information representation and exchange specifications (per sector or per domain)	Native: <i>ongoing</i> <i>eHEALTH</i> <i>M2M SMART Grids</i>	
		Profile based:	
	Horizontal information representation and exchange specifications (to be specialised)		
	Semantic description languages		
TECHNICAL	MESSAGING MECHANISM (WEB SERVICES)	Service Composition	
		Service Discovery	
		Service Description <i>Ongoing</i> <i>M2M (IOT, integration of devices and network)</i>	
		Messaging <i>Ongoing</i> <i>ESI (electronic signature and infrastructure)</i>	
	SYNTAX		
COMMUNICATION MECHANISM (INTERNET)	Transport <i>Ongoing</i> <i>M2M (IOT, integration of devices and network)</i> <i>AFI: Autonomic network engineering for the self-managing Future Internet</i> <i>MTC Mobile Thin Client Computing</i> <i>INS Identity and access management for Networks and Services</i> <i>MOI Measurement Ontology for IP traffic</i>		
	Networking: <i>Ongoing</i> <i>M2M (IOT, integration of devices and network)</i> <i>INS Identity and access management for Networks and Services</i>		

Note: Italic evidences 'ongoing' initiatives.

G.3 OASIS

Interoperability level	Enablers	Specifications	
ORGANISATION	Domain related specifications	- <i>Transformational Government Framework</i>	Ongoing
	Domain independent specifications to achieve collaborations and retrieve resources	SOA Reference Model, WS Federation (WSFED), WS for Remote Portlets (WSRP), WS Business Process Execution language (WSBPEL) ebXML Business Process (ebBP), ebXML Registry, Business-Centric Methodology (BCM) - Ongoing <i>Identity Metasystem Interoperability (IMI),</i> <i>Privacy Management Reference Model (PMRM),</i> <i>Provisioning Services,</i> <i>Identity in the Cloud (IDCloud),</i> <i>Service Component Architecture / Policy (SCA-Policy), SCA /</i> <i>Assembly (SCA-Assembly), SCA / Bindings (SCA-Bindings), SCA /</i> <i>BPEL (SCA-BPEL),</i> <i>SOA Repository Artifact Model and Protocol (S-RAMP),</i> <i>SOA End-to-End Resource Planning (SOA-EERP)</i> <i>Web Services Calendar (WS-Calendar),</i> <i>Web Services Quality Model,</i> <i>Search Web Services,</i> <i>WS Discovery and WS Devices Profile (WS-DD),</i> <i>WS-BPEL Extension for People (BPEL4People),</i> <i>Customer Information Quality (CIQ),</i> <i>Production Planning and Scheduling (PPS),</i> <i>Product Life Cycle Support (PLCS)</i>	
SEMANTICS (Data models, Dictionaries, Ontologies,...)	Vertical information representation and exchange specifications (per sector or per domain)		
	Horizontal information representation and exchange specifications (to be specialised)	Universal Business Language (UBL) - Ongoing <i>Semantic Execution Environment,</i> <i>Test Assertions Guidelines (TAG)</i>	
	Semantic description languages		
TECHNICAL	MESSAGING MECHANISM (WEB SERVICES)	Service Composition (WSBPEL, ...) Web Services Transaction (WS-TX), Web Services Reliable Exchange (WS-RX), Web Services Secure Exchange (WS-SX), ebXML Messaging Services (ebMS) - Ongoing <i>Service Component Architecture / J (SCA-J),</i> <i>Web Services Security Maintenance (WSS-M),</i> <i>Testing and Monitoring Internet Exchanges (TaMIE)</i>	
	SYNTAX		
	COMMUNICATION MECHANISM (INTERNET)		

G.4 OMG

Interoperability level	Enablers	Specifications	
ORGANISATION	Domain related specifications	<p>OMG Domain Specifications: Business Motivation Model (BMM) Business Process Definition Metamodel (BPDM) Business Process Maturity Model (BPMM) Identity Cross-Reference Service (IXS) Management of Event Domains Metamodel for the Federal Transition Framework (FTF) Model Driven Message Interoperability (MDMI) Negotiation Facility (NEG) OMG Systems Modeling Language (OMG SysML) Platform Independent Model (PIM) & Platform Specific Model (PSM) for Super Distributed Objects (SDO) Requirements Interchange Format (ReqIF) Resource Access Decision (RAD) Retrieve, Locate, and Update Service (RLUS) Semantics of Business Vocabulary and Business Rules (SBVR) Task and Session (TSKSES) UML Profile for Enterprise Application Integration (EAI) UML Profile for Enterprise Distributed Object Computing (EDO) Workflow Management Facility</p> <p>Ongoing <i>Business Ecology@ Initiative (BEI)</i></p>	
	Domain independent specifications to achieve collaborations and retrieve resources	<p>OMG Business Modeling Specifications: Business Motivation Model (BMM) Business Process Definition Metamodel (BPDM) Business Process Maturity Model (BPMM) Business Process Model and Notation (BPMN) Production Rule Representation (PRR) Semantics of Business Vocabulary and Business Rules (SBVR) Workflow Management Facility</p>	
SEMANTICS (Data models, Dictionaries, Ontologies,...)	Vertical information representation and exchange specifications (per sector or per domain)	<p>Business Motivation Model (BMM) Business Process Definition Metamodel (BPDM) Business Process Maturity Model (BPMM) Identity Cross-Reference Service (IXS) Management of Event Domains Metamodel for the Federal Transition Framework (FTF) Model Driven Message Interoperability (MDMI) Negotiation Facility (NEG) OMG Systems Modeling Language (OMG SysML) Platform Independent Model (PIM) & Platform Specific Model (PSM) for Super Distributed Objects (SDO) Requirements Interchange Format (ReqIF) Resource Access Decision (RAD) Retrieve, Locate, and Update Service (RLUS) Semantics of Business Vocabulary and Business Rules (SBVR) Task and Session (TSKSES) UML Profile for Enterprise Application Integration (EAI) UML Profile for Enterprise Distributed Object Computing (EDO) Workflow Management Facility</p>	
	Horizontal information representation and exchange specifications	<p><i>Ongoing:</i> Healthcare Community Services Provider Directory RFP IDL to C++0x Language Mapping RFP Healthcare Community Services Provider Directory RFP UML Profile for NIEM (NIEM-UML) RFP Metamodel Extension Facility RFP UML Profile for NIEM (NIEM-UML) RFP Metamodel Extension Facility RFP</p>	

		<p>Cloud Standards Customer Council (CSCC) CSCC: <i>Business Patterns in the Cloud, SaaS: Industry Vertical (Retail, Finance, Telco)</i> CSCC: <i>IaaS: Evolution from infrastructure to workload management</i> CSCC: <i>Reference Architecture,</i> CSCC: <i>PaaS: Landscape and boundary</i></p>	
	Semantic description languages	<p>OMG Modeling and Metadata Specifications: Common Warehouse Metamodel (CWM™) Common Warehouse Metamodel (CWM™) Metadata Interchange Patterns (MIP) Concrete Syntax for UML Action Language [Action Language for Foundational UML] (ALF) Model Driven Message Interoperability (MDMI) MOF™ Support for Semantic Structures (SMOF) MOF™ 2.0 Versioning and Development Lifecycle (MOFVD) Object Constraint Language (OCL) Ontology Definition Metamodel (ODM) Semantics of a Foundational Subset for Executable UML Models (FUML) Service oriented architecture Modeling Language (SoaML®) Software Process Engineering Metamodel (SPEM) UML Diagram Interchange (UMLDI) UML Human-Usable Textual Notation (HUTN) XML Metadata Interchange (XMI®)</p>	
TECHNICAL	MESSAGING MECHANISM (WEB SERVICES)		
		<p><i>Ongoing:</i> Application Programming Interfaces (API) to Knowledge Bases (KB) RFP Application Programming Interfaces (API) to Knowledge Bases (KB) RFP Asynchronous Method Invocation for CORBA Component Model RFP</p>	
		<p><i>Ongoing:</i> RIA Component Interoperability DRAFT RFP Document -- mars/11-08-01 (RIA Component Interoperability draft RFP) Application Instrumentation DRAFT RFP Document -- c4i/11-08-01 (DRAFT Application Instrumentation RFP)</p>	
	SYNTAX	<p><i>Ongoing:</i> Test Information Interchange RFP OMG Semantic Information Modeling for Federation (SIMF) DRAFT RFP Document -- ad/11-08-02 (Semantic Information Modeling for Federation (SIMF) DRAFT RFP) Interaction Flow Modeling Language (IFML) DRAFT RFP Document -- ad/11-08-03 (Interaction Flow Modeling</p>	
	COMMUNICATION MECHANISM (INTERNET)	<p><i>Ongoing:</i> Test Information Interchange RFP Information Exchange Framework (IEF) Policy Vocabulary (IEPV) RFP Language (IFML) DRAFT RFP Information Exchange Framework (IEF) Policy Enforcement Service (PES) RFP</p>	

G.5 W3C

Interoperability level	Enablers	Specifications	
ORGANISATION	Domain related specifications		
	Domain independent specifications to achieve collaborations and retrieve resources	<p>Web Services Addressing 1.0, Protocol for Web Description Resources (POWDER Description Resources, POWDER Formal Semantics, POWDER Grouping of Resources), WS-Enumeration, WS-Eventing, WS-Transfer, WS-MetadataExchange, WS-Fragment, WS-EventDescriptions, WS-SOAPAssertions, Authoring Tool Accessibility Guidelines (ATAG) 2.0, Platform for Privacy Preferences (P3P), Composite Capability / Preference Profiles (CC/PP), Web Services Policy, Service Modeling Language (SML)</p> <p>- Ongoing Service Modeling Language (SML), Web Services Internationalization (WS-I18N), Web Services Choreography, WebID protocol, <i>Federated Social Web</i>, <i>Decisions and Decision-Making</i></p>	
SEMANTICS (Data models, Dictionaries, Ontologies,...)	Vertical information representation and exchange specifications (per sector or per domain)		
	Horizontal information representation and exchange specifications (to be specialised)		
	Semantic description languages	<p>Semantic Annotations for WSDL and XML Schema (SAWSDL), RDF Concepts and Abstract Syntax, RDF Semantics, RDF Primer, RDF Vocabulary Description Language, SPARQL Query Language for RDF, Rule Interchange Format (RIF), Web Ontology Language 2 (OWL 2), Simple Knowledge Organization System Reference (SKOS)</p> <p>- Ongoing <i>Accessible Rich Internet Applications (WAI-ARIA)</i>, <i>Evaluation and Report Language (EARL)</i>, <i>Unified Service Description Language (USDL)</i>, Library Linked Data</p>	
TECHNICAL	MESSAGING MECHANISM (WEB SERVICES)		
	SYNTAX		
	COMMUNICATION MECHANISM (INTERNET)		

G.6 UN/CEFACT

Interoperability level	Enablers	Specifications	
ORGANISATION	Domain related specifications	Business Requirements Specification (BRS): - Cross Industry Invoice - e-Tendering - ...	
	Domain independent specifications to achieve collaborations and retrieve resources	UN/CEFACT Modelling Methodology (UMM)	
SEMANTICS (Data models, Dictionaries, Ontologies,...)	Vertical information representation and exchange specifications (per sector or per domain)	Native: Requirements Specification Mappings (RSM): - eTendering - Cross Industry Invoice Recommendations on use of code lists Profile Based:	
	Horizontal information representation and exchange specifications (to be specialised)	Core Components Data Type Catalogue UN/EDIFACT - Ongoing <i>UN/CEFACT Standard Business Document Header</i>	
	Semantic description languages	Core Component Technical Specification (CCTS) UML Profile for Core Components (UPCC) XML Naming and Design Rules - Ongoing <i>UN/CEFACT Context Methodology (UCM)</i>	
TECHNICAL	MESSAGING MECHANISM (WEB SERVICES)		
	SYNTAX	XML Schemas for Code Lists, Identifier Lists and Business Data/Messages	
	COMMUNICATION MECHANISM (INTERNET)		

ANNEX H: Project outcomes and related scores for EC and EI services

1 [Enterprise Collaboration](#) (3 out of 10 beyond the threshold)

Result	Innova- tivity 0-3⁹⁶	Genera- lity 0-3
1. Baseline EC Services		
a. "Member registration and profiling" Management of member information and member performance profiling (processes, VCOR ⁹⁷ Key Performance Indicator's) for both individuals and organizations.		
<u>Potential relationship to standardisation:</u> are the member's profiles expressed according to VCOR reference model? In this case, have been defined use profiles of VCOR? In this case could they become an improvement for VCOR? <u>Grid subdomain:</u> ORGANISATION --> Domain independent specifications to achieve collaborations and retrieve resources	1	2
b. "Business Opportunity characterization" - Characterization of a Business Opportunity in terms of BOM (Bill Of Material) definition, BOM item information tasks and required competencies to perform them. BO formalization in a structure (WBS).		
<u>Potential relationship to standardisation:</u> could the Coin's BOM (Bill Of Material) model the starting point for a standardised model? <u>Grid subdomain:</u> SEMANTIC --> Horizontal information representation and exchange specifications	1	2
c. "Product Management Service" Structure complex products in catalogues, categories and different configurations		
<u>Potential relationship to standardisation:</u> do they adopt standard for product representation? could they improve these standards? <u>Grid subdomain:</u> SEMANTIC --> Vertical and horizontal information representation and exchange specifications.	0	1

⁹⁶ Degree of Innovativity or Generality: 0= none, 1=low; 2=medium; 3=high;
Innovativity is the degree of innovativity of the project outcomes in respect of the status of art;
Generality is the measure of the applicability of the project outcomes to a wider domain.

⁹⁷ <http://www.value-chain.org/en/cms/3/>

d. "Customer Support Service" Structured classification in catalogues, categories and different configurations of the complex product		
<u>Potential relationship to standardisation:</u> do they adopt standard for product representation? could they improve these standards? <u>Grid subdomain:</u> SEMANTIC --> Vertical and horizontal information representation and exchange specifications	1	1
2. c-PD EC Services (Collaborative Product Development)		
a. Semantic Cluster Management Services (SCMS) it is based on innovative product structure ontology.		
<u>Potential relationship to standardisation:</u> can it make improvements to existing ontologies or tools for managing product structure? <u>Grid subdomain:</u> SEMANTIC --> Vertical and horizontal information representation and exchange specifications	2	2
3. c-PP EC Services (Production Planning)		
a. PnP Collaborative Production Planning Portal (C3P) Model for agent negotiation in "Collaborative Production Planning"		
<u>Potential relationship to standardisation:</u> can it provide a model for agent negotiation in "Collaborative Production Planning"? <u>Grid subdomain:</u> ORGANISATION --> Domain independent specifications to achieve collaborations and retrieve resources.	1	2
b. SaaS Production Planning Service (PPS) Collaborative planning.		
<u>Potential relationship to standardisation:</u> using BPEL. can it make improvements to OASIS PPS Committee activities? <u>Grid subdomain:</u> ORGANISATION --> Domain independent specifications to achieve collaborations and retrieve resources.	1	3
c. Collaborative Quality Management Service (cQMS) "competence profiles" to identify interdependences in a collaborative network for inter-organisational information exchange.		
<u>Potential relationship to standardisation:</u> what is the competence profile? could it be the starting point for a standardised model for product description or company capacity description? is it related to BOM? <u>Grid subdomain:</u> SEMANTIC --> horizontal information representation and exchange specifications	1	2
d. Service oriented text enrichment services (SOTES)		

<p>Services that provide the context to any textual information, they present the basic infrastructure for many planned and future semantically enriched services.</p> <p>Innovation: "SOTES basic services: sentence splitting, tokenization, part of speech, entity extraction, entity resolution, co-reference resolution, anaphora resolution, topic classification, triplet extraction, semantic graph and summarisation"</p>		
<p><u>Potential relationship to standardisation:</u> could it become the starting point for a standardised API for the semantic enrichment?</p> <p><u>Grid subdomain:</u> SEMANTIC --> Horizontal information representation and exchange specifications</p>	2	3
<p>4. c-PM EC Services (Collaborative Project Management) Nothing to put in evidence.</p>		
<p>5. HCI EC Services (Collaborative Human Interaction)</p>		
<p>a. Trusted Information Sharing (TIS) Document-centric information sharing accounting. Innovative Concepts:</p> <ul style="list-style-type: none"> - Dynamically changing access rights <ul style="list-style-type: none"> • Based on previous collaboration outcome • Based on emerging social relations - Fine-grained sharing model <ul style="list-style-type: none"> • Define sensitivity levels within a document depending on info type (XML) • Share more information with closer collaboration partners (system managed) - Actively facilitate collaborations <ul style="list-style-type: none"> • Push information to close partners (avoid spamming but stimulate interest) 		
<p><u>Potential relationship to standardisation:</u> could it provide a base model for trust and accounting in "document-centric information sharing"?</p> <p><u>Grid subdomain:</u> ORGANISATION --> Domain independent specifications to achieve collaborations and retrieve resources</p>	2	2

2 [Enterprise Interoperability](#) (2 out of 7 beyond the threshold)

Result	Innova- tivity 0-3 ⁹⁸	Genera- lity 0-3
<p>1. Baseline EI Services</p> <p>...</p>		
<p>2. Information EI Services</p>		
<p>Innovative Services for Semantic Reconciliation: “The output of the mapping discovery service is then a declarative mapping, closed to the output of an ontology matching algorithm, but capable of capturing complex correspondences that are directly interpreted as complex mapping rules, to be used in a mediation task.”</p> <p>UBL is used.</p>		
<p><u>Potential relationship to standardisation:</u> Might be there is some kind of interest in standard creation related to Document Mapping Rules representation to be supplied to mediators? (in Semantic Mapping Discovery Service and Semantic Reconciliation Rule Generation Service)</p> <p><u>Grid subdomain:</u> SEMANTICS--> Horizontal information representation and exchange specifications</p>	2	2
<p><u>Potential relationship to standardisation:</u> Might be there is some kind of interest in standard creation/extension related to negotiation modelling and party profile modelling (ebxml CPP extensions?) Contribution to ebXML CPA? (in Data Payload Interoperability Service) ?</p> <p><u>Grid subdomain:</u> SEMANTICS--> Vertical information representation and exchange specifications</p>	1	2
<p>Innovative Services for Federated Interoperability: “The UBL document is analyzed at schema level and decomposed into several parts, each one representing a single main node of the document. For each part several possibilities of transformations exists, according to the target document format or even just uploaded by end users”</p>		
<p><u>Potential relationship to standardisation:</u> Potentially tools supporting/facilitating the standard adoption. Could these micro-transformation become part of standard use profiles? ?</p>	2	3

⁹⁸ Degree of Innovativity or Generality: 0= none, 1=low; 2=medium; 3=high;

Innovativity is the degree of innovativity of the project outcomes in respect of the status of art;
Generality is the measure of the applicability of the project outcomes to a wider domain.

<u>Grid subdomain</u> : SEMANTICS--> (Horizontal) information representation and exchange specifications		
3. Knowledge EI Services		
Semantic Supporting Services (SSS) : are semantics driven services for acquiring, gathering and organizing knowledge about Competence and Skills (CS) in a Collaborative Network (CN). The knowledge assets of the enterprises in the CN are described using the knowledge in the CSOnto.		
<p><u>Potential relationship to standardisation</u>: CSOnto might be a reference or contribution for CS standardised representation?</p> <p><u>Grid subdomain</u>: SEMANTICS--> Horizontal information representation and exchange specifications</p>	1	2
<p><u>Potential relationship to standardisation</u>: From this outcomes could be extracted a model and syntax for a standard for Enterprise Semantic Profiling? For example a Contribution to extend ebXML CPP? ?</p> <p><u>Grid subdomain</u>: ORGANISATION --> Domain independent specifications to achieve collaborations and retrieve resources</p>	1	2
<p>Knowledge interoperability Services (KIS): which provides advanced business services. These advanced services are ontology based and are built on top of the SSS.</p> <p>Nothing else to put in evidence beyond CSOnto.</p>		
4. the Business EI services		
<p>Business Process Interoperability (CBPip) Services ensure a successful business process collaboration of participating enterprises. The project concentrated on two main streams: rule-based transformation of private business processes into public processes, and business process collaboration problems at business process (executional) level.</p>		
<p><u>Potential relationship to standardisation</u>: SBVR annotation mechanisms and public view creation mechanisms could be an improvement for SBVR?</p> <p><u>Grid subdomain</u>: ORGANISATION --> Domain independent specifications to achieve collaborations and retrieve resources</p>	1	2
<p><u>Potential relationship to standardisation</u>: Categorization and classifications of Collaborative Business Processes interoperability (CBPip) gaps (potentially identification of a taxonomy and related patterns).</p> <p><u>Grid subdomain</u>: ORGANISATION --> Domain independent specifications to achieve collaborations and retrieve resources</p>	1	3