D74.1

Report with MSEE standards candidates, requirements and state of the art

M12 issue

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VERSION HISTORY

	NOTES AND COMMENTS
0.1	TABLE OF CONTENTS, DISCUSSION AND INITIAL TEXT PARTS
0.2	COMPLETE TEXT, DISCUSSION OF QUESTIONNAIRE RESULTS AND ON EXTERANL STATE OF THE ART
0.3	IMPROVED PRESENTATION OF TEXT AND TABLES, ADDITION OF BIBLIOGRAPHY
0.4	DETAILS OF CONTENT AND PRESENTATION FINALISED
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DELIVERABLE PEER REVIEW SUMMARY

ID	**Comments**	**Addressed (✓) Answered (A)**
1	This deliverable is aligned with the DOW. Minor comments have been added. ISO 9004:2009 might be taken into consideration as far as maturity models are concerned.	Comments have been taken in account particularly the logic to present the parts and also the numbering of chapters
2		
3		
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1. Executive Summary

The objective of Task 74.1 is to 'Analyse and assess MSEE results from the standards viewpoint'.

The deliverable D74.1 presents the results produced in the timeframe M03 to M12 of MSEE.

First, we have elaborated and performed an online survey on standardisation with the project partners. The survey shows that 93% of the answers states a need to develop standards in MSEE field. The results of the survey provide valuable comments about the areas where to develop new standards. Follow up activities as well as a coordinated dissemination plan will be derived in the next period. This survey has allowed to disseminate the role of standard toward the partners to become them aware on standardization.

Second and in parallel, we have investigated, cooperating with the project partners, the state of the art in standardisation, by selecting and analysing upcoming standards in the chosen domains of MSEE namely in Enterprise Services, Enterprise Interoperability and Internet Technologies. This section terminates with a brief comparison of the MSEE objectives and a workplan with the latest ICT standardisation policies of the European Union.

2. Introduction and Plan

Standardisation - the creation and use of standards - is built on voluntary cooperation among industry, academia, consumers, public authorities and other interested stakeholders. Standards complement the development of technical specifications and ease the implementation of innovative products and services.

There is an issue of research and standardisation which can be addressed from two perspectives, namely, how can research results contribute to standardisation and how can the research results (and actors) benefit from standards.

The MSEE WP74 'Access and contribution to Standards' is aiming:

1. to promote the transfer of MSEE research results to create specific standards in the relevant project domains. This requires, for the partners, an early involvement in the project life cycle and a clear understanding of the standards creation process.

2. to motivate and support Academia, Researchers and Industry in the process to transform project results into new standards. Information about Standardisation results must be actively disseminated inside and outside of the MSEE project. WP74 has to establish a common level of knowledge and understanding among the project partners about the status and requirements for new standards in MSEE project, especially in the chosen domains of Enterprise Services, Enterprise Interoperability and Internet Technologies.

3. to develop relations with Standards Development Organisations (SDO) and Industry consortia, in order to understand better the way to develop standard.

This leads to the plan of this deliverable D 74.1:

- to establish and carry out a survey on standardisation in order to determine the level of understanding in the domain of standard among MSEE partners (see chapter 3),
- to report the state of the art of recent or upcoming standards in the domains Enterprise Services, Enterprise Interoperability and Internet Technologies. An overview of the relevant areas and standards is provided (see Chapter 4),
- to analyse the internal survey results and by comparison with the external survey to identify the topics for future standardisation development as well as for dissemination. (see chapter 5)

3. Internal Survey of Standardisation in MSEE

The survey was started as part of Task 74.1: analyse and assess MSEE results from the standards viewpoint.

3.1 Questionnaire

A questionnaire with eight questions regarding understanding, expertise and the role of standardisation has been prepared and elaborated with the project partners (see here after). A total of 18 answers have been received in the time frame May to July 2012. The survey was carried out with an online market survey tool 'SurveyMonkey'.

3.2 Analysis of the questionnaire

The answers of the partners to the eight questions of the survey are presented in the Tables 1 and 2 below.

In Table 1, the questions are displayed in the left column, whereas the quantitative answers are shown in the middle column. The right column gives additional details.

In Table 2, we have again the questions in the left columns and comments at the right column.

The findings are summarised as:

- 93% of the answers states a need to develop standards in MSEE, which indicates a positive attitude vis-a-vis the role and importance of standardisation;

- 50% of the answering partners says that they are involved in standardisation. The figure suggests that experienced experts are available among the partners, additional education and training would to be valuable;
- The most proposed areas for standards development are Service Modelling, Enterprise Interoperability Framework(s) and Infrastructure Services;
- CEN is regarded as the preferred organisation to initiate or to continue work on standardisation. There are also other organisations proposed depending on the capability and expert knowledge of the partners.
- The individual comments shown in Table 2, need a more detailed analysis.

Table 1 ***Answers and results per question***

Question	Number of answers, Results Yes/No	Additional Details
1. ID of answering person?	18 answers received	
2. Have you been involved in the development of standards?	18/18 answers received 9 Yes, (50%), 9 No	
3. If yes, in which domains? (e.g.: Enterprise Services, Enterprise Interoperability, Internet Technologies)	12/18 answers received 6 Yes (50%) 6 No	
4. Have you been in contact with Standards Development Organisations (CEN, National organisations, OMG...)?	12/18 answers received 6 Yes (50%) 6 No	
5. In your opinion, do you see needs for standardisation within the MSEE project?	15/18 answers received 14 Yes (93%) 1 No	
6. If yes, in which domain(s) do you think that MSEE can propose new standards?	Enterprise Interoperability Framework 7 Service modelling and LC 12 Infrastructure Structural Services 2	Other areas proposed: XML, QML, USDL, Languages for Services / for Systems, Methods for SSME, Maturity Models
6. If yes, in which domain(s) do you think that MSEE can propose new standards?	Enterprise Interoperability Framework 7 Service modelling and LC 12 Infrastructure Structural Services 2	Other areas proposed: XML, QML, USDL, Languages for Services / for Systems, Methods for SSME, Maturity Models
7. If yes, what SDO do you recommend?	CEN 9 National 1	Other proposed: OG, OASIS, W3C, ISO TC 184, CEN CWA

Abbreviations:
SDO=Standards Development Organisation,
OG=Open Group,
CWA=CEN Workshop Agreement

Table 2 *Comments per question*

Question	Comments
1. ID of answering person?	
2. Have you been involved in the development of standards?	
3. If yes, in which domains? (e.g.: Enterprise Services, Enterprise Interoperability, Internet Technologies)	- Internet technologies cad/cam lectra & gerber technology for cutter interoperability eBIZ textile: http://ebiz-tcf.eu/ - Product/service lifecycle management - Business Modelling and Integration - Semantic Web Services, Semantic WEB - Enterprise Interoperability, Enterprise Modelling - UBL2.0 SBS in 2007
4. Have you been in contact with Standards Development Organisations (CEN, National organisations, OMG...)?	- CEN for clothing sizing charts - Yes. I am Planning and Policy Committee member in ISO TC184/SC4, and active as project leader developing standards in this committee. I am also the head of the Portuguese Delegation - Yes, I have been working in cooperation with BSI, as far as translation and review of standards are concerned
5. In your opinion, do you see needs for standardisation within the MSEE project?	
6. If yes, in which domain(s) do you think that MSEE can propose new standards?	- It would be useful to interface with the ongoing standardization that we are carrying out on product-service lifecycle management, called QLM, within the OpenGroup - User oriented Service modelling for Service Life Cycle Manufacturing - Propose Languages for modelling services and service system
7. If yes, what SDO do you recommend?	- USDL standardization efforts seem to move towards Linked Open Data approach. Creation of a "USDL Manufacturing Profile" could be an appropriate way to position MSEE requirements in the area of service description as a de-facto standard. - ISO. As an experience from the past, which resulted in 29 ISO standards, I would recommend to create a CEN Workshop, and then develop CEN Workshop Agreements (CWAs) to be submitted immediately after to ISO for international standardisation

4. External State of the art in standardisation related to the Domains of MSEE

In this chapter we introduce a survey on the main SDOs and the supported standard. We have tried to choose domains connected with MSEE domains

4.1 CEN/ISO

CEN, the European Committee for Standardization (Comité Européen de Normalisation, Europäisches Kommitee für Normung)[1] provides a platform for the development of European Standards (ENs) and other technical specifications. CEN works in a decentralized way: its members operate the technical groups that create standards; the CEN-CENELEC Management Centre (CCMC) in Brussels manages and coordinates this system. 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 consultation

In their strategy CEN is defining among others future drives to support to the growth of the European services market and to reduce the time to market of new technologies and services, A potential future area for standardisation in MSEE could be in the area of 'federated services platforms' that need to find a technical specification for the interoperability of services as well as for the setting up of legal, business and organisational reference framework for their future activities.

CEN is working in strong connection with ISO (International Standards Organisation)

Recent Standards

Standardisation in Enterprise frameworks is carried out by European and international standardisation organisation as well as by industry consortia. There exist several standards that can support particular aspects of enterprise integration and interoperability like unifying process model representation (CEN/ISO 19440), harmonising information representation (ISO 10303), or enable capturing of software capabilities (ISO 16100).. Table 3 provides an overview on relevant standards and work in progress performed in CEN and ISO,

[1] CEN: http://www.cenorm.be

Table 3 ***Relevant CEN and ISO standards***

Standard id	Name / Description
CEN/ISO 19439	Enterprise integration - Framework for Enterprise Modelling
CEN/ISO 11354	Framework for Enterprise Interoperability
CEN/ISO 19440	Constructs for Enterprise Modelling
CEN-ISSS EBIF	CEN eBusiness Interoperability Roadmap
ISO 18629	Process Specification Language, (multi-part set of standards)
ISO 15531	Industrial manufacturing management data (MANDATE)
ISO 10303	Standard for Product Data representation and exchange (STEP)
ISO 13584	Parts Library (PLIB)
ISO 15289	Content of systems and software Life Cycle process information products
ISO 15926	Integration of Life-Cycle data for process plants including oil and gas production facilities
ISO 18876	Integration of industrial data for exchange, access, and sharing (IIDEAS)
ISO 15745	Framework for Application Integration
ISO 16100	Manufacturing software capability profiling for interoperability
ISO 22745	Open Technical Dictionary
ISO 8000	Information and Data Quality

The above standards are fundamental in the enterprise world. Particularly the standard set CEN/ISO 11354 - Framework and Maturity Model for Enterprise Interoperability, might be interesting or further enhancement in the MSEE.

We have also to consider ISO 9004:2009 “Managing for the sustained success of an organization", especially Annex A

4.2 Ontologies

A useful definition of an ontology is specified in the Process Specification Language standard (ISO 18629-1, 2004) and as: “An ontology is a lexicon of specialised terminology along with some specification of the meaning of terms in the lexicon.”

The development, agreement upon and use of foundation or core concept ontologies are significant for any ICT research e.g. also for MSEE. As such ontologies provide a strong basis for cross-domain sharing of knowledge, e.g. for the development of standards. An example of work in this area is provided by the UN/CEFACT Core Component Technical Specification and OASIS Semantic interoperability Support for Electronic Business Document Interoperability (SET) TC which are applied to the interoperability of electronic documents exchanged in eBusiness applications. More details can be found in the FInES Task Force Report.

4.3 ETSI

The European Telecommunications Standards Institute (ETSI)[2] produces globally-applicable standards for Information and Communications Technologies (ICT), including fixed, mobile, radio, converged, broadcast and internet technologies. ETSI is recognised by the European Union as a European Standards Organisation. Due to the high quality of work and the open approach to standardisation ETSI has evolved starting from into a European roots into a global organisation. ETSI is a not-for-profit enterprise with more than 700 ETSI member organisations from 62 countries across 5 continents world-wide.

The strategy of ETSI is oriented towards :

- Producing Global Standards for telecommunications and electronic communications networks & related services for the global market place...'
- Creating ICT standards for the European market place in the European Standards Organization (ESO)
- Providing services in the area of Interoperability testing, in Fora and in the Service Organisation – which is hosting and developing protocol and testing specifications

An important area seems to be Machine-to-Machine communication (M2M), an architecture made of a number of standards and components, with top level applications and services that are independent from the devices (the 'things') that are connected.

There could be interest to investigate the MSEE approach for the EI service delivery and the model for service platform federation could result in contributions possibly with the vision to face the IoT side of the Future Internet-

4.4 OASIS

OASIS (Organization for the Advancement of Structured Information Standards)[3] 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 was initiated in 1993 as Standard Generalized Markup Language (SGML). In 1998, the name was changed to OASIS, which included Extensible Markup Language (XML) and later Unified Business Language (UBL), which meant broadening its scope.

OASIS produces global standards of 15 categories; 5 of them might be interesting for standardisation in MSEE.

[2] ETSI: http://www.etsi.org
[3] OASIS: http://www.oasis-open.org/org

Table 4 *MSEE oriented categories of OASIS standards*

Standard category	Description / Justification
Cloud Computing	This technology is fundamental in the service platforms based on the concept of Software as a Service (SaaS) concept
Service Oriented Architecture (SOA**)**	MSEE is designed as a service-oriented federation of platforms
Web Services	Same reason, MSEE is designed as a service-oriented federation of platforms
Conformance and maturity	The ATHENA maturity levels paradigm is inherited in MSEE Enterprise Collaboration
Supply Chain aspects	Concepts like "model-driven architecture", "common object models" and "public or private processes" are used in OASIS as well as in MSEE.

4.5 OMG

The Object Management Group (OMG) [4] was founded in 1989 is a worldwide not-for-profit organisation with open membership. OMG's is focused on the modelling of programs, systems and business processes as well as on model-based standards[5].

The OMG goal has been to deliver standards for enterprise integration that provide real-world practical value to industry. A strict release process is applied to turn a proposed specification into an OMG Standard. Before a specification can be accepted, the members of the winning proposal submitter must guarantee that they will bring a conforming product to market within a year.

Modelling standards of the OMG include: the Unified Modelling Language™ (UML®) and Model Driven Architecture® (MDA®), which enable visual design, execution and maintenance of software and processes, including IT Systems Modelling 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.

Most of the above standards are wide spread used in industry. MSEE might consider an involvement in Service Level Modelling (SLM), for instance in SOAML (Service Oriented Architecture Modelling Language)

4.6 W3C

The World Wide Web Consortium (W3C)[6] is an international organisation with member organisations. A full-time staff and the public participation work together to produce 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.*

[4] http//www.omg.org
[5] http://wikipedia.org/wiki/Object_Management_Group
[6] http//w3.org

The W3C development process is the set of steps and requirements followed by W3C Working Groups to standardize Web technology. Through this process, W3C seeks to reach consensus about the content of a technical report, to ensure high technical and editorial quality, to promote consistency among specifications,

Input to the W3C standards process may come from several places, including:, W3C Workshops, Incubator Groups, Member Submissions or Team Submissions

W3C standards define the "Open Web Platform" for application development that has the potential to enable developers to build rich interactive experiences, powered by vast data stores, which are available on any device.

W3C has developed standards that are the base of actual Internet. HTTP, HTML, XML and XML Schema are W3C standards or specifications that are basic for the Internet infrastructure, as for example, the W3C Recommendation "Architecture of the WWW".

In addition, a number of ongoing European Initiatives or projects have been selected which elaborating on the Future Internet with focus on common concepts, approaches or on infrastructure frameworks which might be important for future standardisation activities in MSEE.

4.7 Recent Research in standardisation

During the last years several initiatives have been started with support from the European Commission to harmonise the output of EU funded research project in order to achieve a more comprehensive overall result from the particular work.

IERC[7]

The European Research Cluster on the Internet of Things (IERC) is bringing together EU-funded projects with the aim of defining a common vision and the IoT technology and development research challenges at the European level in the context of global development.

In the Internet of Things (IoT) concept, "smart things/objects" are expected to become active participants in business, information and social processes where they are enabled to interact and communicate among them-selves and with the environment by exchanging data and information "sensed" about the environment.

The FInES Cluster[8]

The Future Internet for Enterprise Systems (FInES) Cluster brings together EU funded projects, with the goal to solve issues of general interoperability and enabling easy and intuitive creation of services and applications The work of the cluster is organised in 12 tasks on being the Fines Standards and Standardisation Taskforce. The TF has examined the

[7] http://www.internet-of-things-research.eu/
[8] http://www.fines-cluster.eu/

correspondence between research in the area of FInES, analysing correspondences, identifying problems and issues and making recommendations for improving the links between RTD and standardisation.

5. Specific MSEE standardisation Domains

5.1 Domains in which potential standard could be developed in MSEE

In this chapter, taking in account the various domains in which MSEE is operating, we have selected the following domains in which there are a potentiality to develop standard. Then based on the internal survey, we will propose some topics.

Service Oriented Architecture (SOA) is a concept existing since long time a service-oriented architecture (SOA) is a set of principles and methodologies for designing and developing software in the form of interoperable services. These services are well-defined business functionalities that are built as software components. .[2] As mentioned in chapter 4 , quite a number of standards is already available many more are in development mainly in the Object Management Group (OMG)

Digital Business Ecosystem (DBE), seen from a high view is a distributed adaptive open socio-technical system with properties of self-organisation, scalability and sustainability inspired from the knowledge of natural ecosystems. Being in an emerging field of research, the term "digital ecosystems" is used by the computer industry [

From a more practical viewpoint, DBE (Digital Business Ecosystem)[9] is a free, open source and distributed software platform. The platform developed in a European FP6 Integrated Project is based on Internet technologies and is designed to enable SMEs, specifically, to create, integrate and provide services - both in real world business and in software- in a more efficient way. An important characteristic of DBE is that SMEs can, at a low cost, bridge the digital ‘wall’ that many experience when advertising their goods and services on the Internet. The follow up organisation of the project offers software to the user that connects to the so called DBE’s peer-to-peer 1 environment. The DBE can communicate through open standards such as SOAP 2 (Simple Object Access Protocol) allowing interaction with W3C (World Wide Web Consortium) compliant web services.

With the new paradigm of dynamic IT business integration in open environments specific new standards and reference solutions will be required for new Value Systems and Business models, for evolutionary adaptive software systems as well for natural and formal languages.

Service Science Management and Engineering (SSME) has been proposed by IBM as an area of integrated research in the fields of measuring, representing and cataloguing services

[9] http://www.digital-ecosystem.org/

and skills to be applied in service workforce management and in effective computer supported service automation

From another viewpoint, MSEE [10]envisages an Integrated Service Lifecycle Management reference model, which could become a standard by itself. Diverse approaches, terms, terminologies and methods in Service Lifecycle Management need to be collected and analysed for suitability of standardisation.

Similar standards on Product Lifecycle Management (PLM) exist as for instance ISO 10303 'Automation systems and integration - Product data representation and exchange' a standard which was further adapted into the open standard STEP (STandard for Exchange of Product data model) and implemented with various sector oriented Application Protocols (AP) via the industry consortia PDES, Inc and ProSTEP .

Standardisation in Service Modelling; Service modelling is a key element of any service-oriented system. It is the foundation on which core service-related tasks such as service discovery, composition, and mediation rely. During the past years standardization bodies as W3C, OMG and OASIS have been working on standardizing various aspects of services following the categories of service functionalities, behaviour, quality of services etc. As one example, the OMG Service oriented architecture Modelling Language (SoaML) [11]. provides a concrete implementation of service modelling using a standardised approach in the manufacturing sector

User Specifications of Enterprise Business Services: Standards for the service economy have been elaborated with the Fraunhofer IAO Institute and the German Institute for Standardization DIN[12] (Deutsches Institut für Normung e.V.), to address the needs of business end users. These standards have been published as Publicly Available Specifications (PAS, 2008-2011). Some examples of manufacturing oriented services are given below:

PAS 1018: Essential structure for the description of services in the procurement stage
PAS 1019: Structured model and criteria for the selection and evaluation of capital services
PAS 1076: Establishing, expanding, and improving international services
PAS 1083: Approach for assessment of requirements for international service providers and criteria catalogue

5.2 Proposed domains to develop standards in MSEE

As the survey indicates, work efforts in standardisation development are on-going, planned or proposed. The challenge will be to turn the proposals into real activities in a common coordinated approach

[10] http://www.MSEE-ip.eu, DoW, WP2 ,
[11] D. Roman et al; Standards and Initiatives for Service Modelling – The Case of OMG SoaML, Enterprise Interoperability, IWEI 2011 Workshop Proceedings, ISTE-Wiley
[12] http://www.DIN.de

As the next step, the priorities for standardisation work items new work groups must be further analysed with the partners. Three areas for potentials standards development can be identified from the survey results

- Enterprise Interoperability/Enterprise Modelling (in Sub-Project SP1). An extension of ISO 11543 looks promising;
- Service modelling and Service Life Cycle (in Sub-Project SP1). This includes USDL (Universal Service Description Language from OMG) or other modelling languages for Services or for Systems as well as Methods for SSME;
- Semantic WEB Services (in Sub-Project SP2);

These initial proposals will be further elaborated with the partners, in order to start concrete activities. The budget for standardisation is quite low, hence we have to constrain the proposals to the most promising work items.

6. Opportunities for dissemination and future standardisation

Workshops and active participation at international conferences are considered a very effective opportunity to disseminate knowledge on standardisation created in MSEE and to attract an appropriate audience. They will be part of the project dissemination plan

Several opportunities for standards development have already been identified in the above described survey, namely in the areas

1. Enterprise Frameworks/Enterprise Modelling, where an extension of ISO 11543 seems advisable. This will be elaborated with the partners in the MSEE Sub-Project SP1

2. Service modelling and Service Lifecycle Management where diverse approaches, terms, terminologies and methods need to be collected and analysed for suitability of standardisation. To be identified with the partners in the Sub-Project SP1

3. Semantic WEB Services will be addressed in Sub-Project SP2.

In addition, a table is proposed below showing standards which appear to correspond with the outcomes of workpackages.

Table 5 *Corresponding Standards*

MSEE workpackage	Corresponding domain of Standards	Source/ Comments
Enterprise related Architectures WP21: Reference Framework for Innovation Ecosystems WP31 FInES Reference Architecture WP41: MSEE Functional and	Requirements for Enterprise Reference Architecture and Methodologies Concepts and Rules for Enterprise Models	ISO 15704 ISO 14258

Modular Architecture		
Enterprise Modelling WP24: Maturity Models and Change Mgmt WP 53 Virtual Factories & Enterprises Business & Industrial Models	Modelling Languages UML, BPMN, UBL	
New Organisation concepts WP52: Virtual Factories & Enterprise requirements collection & specification	Requirements for Enterprise Reference Architecture and Methodologies	ISO 15704
Enterprise Services WP11: Services Modelling for SLM WP14: Service Life Cycle Mgmt in Virtual Factories & Enterprises	Service modelling languages USDL, SoaML	OMG specifications, in development
Infrastructure and Platforms WP26: Innovation Ecosystems Platform WP32 FI Platforms Federation WP33 Future Internet Utility Services WP43 MSEE Generic Service Delivery Platform WP44 MSEE Generic Mobile Business Platform	Internet of Things (IoT) Reference Platform ETSI standards	

These initial proposals will be further elaborated with the partners, in order to start concrete activities. Since, he budget for standardisation is activities is quite low, we have to select the most promising work proposals .To further analyse the opportunities, a table with the MSEE workpackages related and potential standards project results is proposed.

7. Standards development – when to start?

There is a specific issue of research and standardisation which can be addressed from two perspectives, namely, how can research results contribute to standardisation and how can the research results (and actors) benefit from standards.

A major reference about facilitating relationships between an ICT research and standardisation is provided by the COPRAS[13] project. The COPRAS Guidelines define three recommendations:

- standardisation is one opportunity for ICT research projects to disseminate their results
- identification and planning of standardisation efforts should be started at the beginning of the project activities
- direct involvement of the project partners with standardization bodies is highly recommended.

Apparently, COPRAS can also be used as guideline in MSEE

[13] COoperation Platform for Research And Standards (COPRAS) , http://www.w3.org/2004/copras/

8. Conclusion

With an internal survey of standardisation, we have made a first step towards establishing a common understanding of standards and standardisation needs throughout the MSEE project.

Based on the initial results of the survey and the state of the art, the upcoming activities will focus on the dissemination of the outcomes, on workshops and other efforts to initiate involvement in standardisation in cooperation with the partners along the project workplan.

9. Bibliography

The referenced documents below represent a selection of frameworks and roadmaps as well as of scientific papers, reports and formal or industry type standards or specifications. They concern either single or multiple standards or have strong aspects of both standardisation and of research. The documents are presented in categories, the standards are of generic type e.g. not specific for an industry sector. These selected publications apparently match with the goals of the MSEE.. Hence, they are also helpful to identify areas where new standards are needed.

The abbreviations used are explained in a table at the end of the section.

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Industrial Automation and Integration (Multi standards)

Open systems application integration framework, ISO 15745 (2003), ISO/TC184/SC5, http://www.iso.org

Manufacturing software capability profiling for interoperability, ISO 16100 (2009), ISO/TC184/SC5, http://www.iso.org

Enterprise control-system integration, IEC/ISO 62264 / ISA-95 (2003-2007) http://www.isa.org

Data models and Information exchange (Multi standards)

Standard for the exchange of product model data, STEP, ISO 10303, TC184/ SC4 Industrial data, http://www.iso.org

Information and data quality, an upcoming multi standard ISO 8000 (2012), TC184/ SC4

Catalogue of OMG Modelling and Metadata specifications – MOF, OCL, UML, XMI (2007) OMG, http://www.omg.org

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http://www.unece.org/cefact/codesfortrade/unccl/CCL_index.html

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Process Specification Language ISO 18629, (2004), TC184/ SC4, http://www.iso.org

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Unified Service Description Language (USDL), W3C USDL Incubator Group, (2011), available from http://www.w3.org/2005/Incubator/usdl/

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Product Life Cycle Management - the QLM Working Group (2012) of the OpenGroup, available from https://collaboration.opengroup.org/qlm

Cloud Computing and Collaborative Platforms

The NIST definition of Cloud Computing, recommendation the National Institute of Standards and Technology, Mell P., Grance, T (2011) available from http://pre-developer.att.com/home/learn/enablingtechnologies/The_NIST_Definition_of_Cloud_Computing.pdf

Service-oriented Architecture Standards, SOA Work Group (2012), The Open Group, available from http://www.opengroup.org/standards/soa

Software as a Service , Saas Standards, White paper available from http://www.saasstandards.com/

List of collaborative software, (2011), available from http://en.wikipedia.org/wiki/List_of_collaborative_softwareR

R**elevant Standards Development Organisations**:

CEN	Comité Européen de Normalisation
CENELEC	European Committee for Electrotechnical Standardisation
ETSI	European Telecommunication Standards Institute
IERC	European Research Cluster on the Internet of Things
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organisation for Standardisation
NIST	National Institute of Standards and Technology
OASIS	Organization for the Advancement of Structured Information Standards
OMG	Object Management Group
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
W3C	World Wide Web Consortium

10. ANNEX: European Standardisation Strategy

In this high level white paper[14], the role of standardisation in the EU in the time frame 2011-2013is described as a voluntary cooperation among industry, consumers, public authorities and other interested parties for the development of technical specifications. Industry uses standards to meet market needs – to support its competitiveness, to ensure acceptance of innovative solutions or to increase

In particular, Chapter 2.3: 'Fostering synergy between ICT research, innovation and standardisation'is addressing the issues of standards development.

Many ICT R&D projects lead to highly relevant research results. However, they are often insufficiently translated into concrete applications that can be commercialised at a later stage. Standards are one important way to promote the translation of research results into practical applications.

Initiatives to better link ICT standardisation and ICT R&D appear to be most effective when carried out at the level of the research planning phase rather than simply at the execution phase of the specific research project. Standardisation awareness thus needs to be considered early in the research life cycle and should be an integral part of strategic research agendas developed by European Technology Platforms (ETPs).

- The Commission suggests regularly consulting standardisation and research stakeholders, in particular ETPs, to ensure that relevant European research initiatives contribute most effectively to ICT standardisation activities.

- The Commission suggests that standardisers adapt their procedures where necessary to ensure that contributions from research organisations, consortia and projects facilitate the timely production of ICT standards.

- The Commission suggests that Member States consider a similar approach to any ICT R&D initiatives at national level

MSEE is in agreement with the above recommendations, however, the timely implementation of new standards is considered a critical issue which needs continuous involvement of all stake holders as well as attention and support from the project management.

[14] Modernising ICT Standardisation in the EU - The Way Forward, Brussels, COM (2009) 324