Letter from Standardization

Towards standardization during research – the Service Modelling Language

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Abstract. Research and standardization are often considered concepts that exclude each other or follow one another with a time distance of years. On the other hand standards can be very beneficial to ease all kinds of interoperability problems in and between enterprises to integrate system components. Since based on consensus between many stakeholders, the time to develop standards is high. The article presents an example of early involvement in standardisation of product related services in Future Manufacturing Ecosystem during its research and development phase in the European project MSEE.

Keywords. Product related services, Service Modelling Language, Manufacturing Ecosystem.

1 General Requirements

The vision of Future Manufacturing Ecosystem in the European Manufacturing Service Ecosystem (MSEE) project (MSSEE 2010) is focussed on the principles of systems engineering and enterprise modelling in cooperating enterprises. These are the most important ones for the development of innovative products or services. The MSEE project develops a framework for modelling a Service System, which is supported by languages to build such models. These models will guide production innovation and reduce the costs arising from miscommunications and misconceptions in cooperating organisations with proprietary solutions for their information systems. Such problems can best be resolved by using international standards, since they insure worldwide consensus and interoperability.

However usually standardization follows research with the distance of several or even many years, which then faces the situation of the availability of many incompatible products and the resulting problems in interoperation. To insure early availability of such standards, standardization efforts have to start in the research phase of any product development. This practice is used in the MSEE project where research and standardization evolve almost in parallel.

The current situation is that there is no language standard (ISO and CEN) for the modelling of a service system in Manufacturing (MSEE D742, 2013 and Chen 2013). Some existing service modelling languages focus on IT related services or Web services. On the other hand, most existing enterprise modelling languages are relevant to model services in the Virtual Manufacturing Enterprise (VME), and this means that they can be reused to model part of a service system in the context of VME.

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2 Framework and modelling methodology for services

The MSEE project proposed that standardization would start early during the research phase, thus enabling the benefits of fast standardization for the whole community stakeholders. The Model Driven Service Engineering Architecture (MDSEA) developed in the project is adopted for the global modelling of Service System. The architecture is based on Model Driven Architecture (MDA) and Model Driven Interoperability (MDI) and enables the modelling the three types of service system components - IT, Human and Physical Resources (Chen et al 2012, Chen 2013). MDSEA can be considered as an adaptation and an extension of MDA/MDI to the engineering of product-related services in virtual manufacturing enterprise environment

The proposed multiple-part standard specifies requirements to model services both within and between operational environments of manufacturing enterprise. It defines a Service Modelling Language (SML) for the design and implementation of service systems in a Virtual Manufacturing Enterprise environment. The Model Driven Service Engineering Architecture (MDSEA) acts as a framework for the proposed service modelling language.

Architecture Standards used for SML

- MDA – Model Driven Architecture, an open, vendor neutral framework developed in the Open Management Group (OMG 2008)
- MDI: Model Driven Interoperability; A definition is given at ATHENA IP (2010)

3. Service Modelling Language

The proposed Service Modelling Language (SML) developed in the MSEE project, (MSSEE 2010) is concerned with the operational interworking of manufacturing enterprise processes and the interoperability of supporting software applications. The language starts with the user view at the Business Services Models (BSM) level focusing on the aspects of business process, decision-making and information. It prepares for the link to the software development to make the models executable via transformation of models between the modelling levels.

SML is defined by a set of modelling concepts/constructs with identified interrelationships between the constructs. Construct(s) can be represented by: (a) graphical representation, (b) template description, and (c) text. A template will contain a header part to identify a construct instance, and a body part to describe the particular instance with descriptive and relationship attributes (Chen 2013)[r]

The advantage of the SML is the capturing of the perspective of the business user by modelling services in the context with business processes, activities, decision making. This orientation towards the business user (enterprise engineer, designer) represents the main benefit compared to other approaches of modelling service messages or the interchange of services. On the other hand the MDSEA approach is rather complex and requires a number of models, in different languages, as well as model exchange between the model levels.

This standard would apply to manufacturing enterprises but can also be employed in other classes of enterprises. It is intended for use by IT and research specialists who are concerned with developing and deploying IT-based solutions for manufacturing enterprise process interoperability.

The proposed Service Modelling Language (SML) is using several modelling

language standards of CEN, ISO and OMG described by Chen (Chen 2013). In particular, EN/ISO 19440, (Enterprise Integration – Constructs for Enterprise Modelling), to model process, resource and organisation, as well as CEN/ISO 11354: "Requirements for establishing manufacturing enterprise process interoperability". Further inputs may come from a comparison and mapping with the upcoming OMG standard "Value Driven Modelling Language" (Berre at al 2013).

Besides the development of the SLM specification, three industrial pilots have been set up to demonstrate the technical feasibility as well as the Modelling Language business benefit for the service oriented ecosystem. Such industrial pilots are presented during a number of industry workshops during the MSEE project. The validation of the SML is still an on-going activity.

4. Concluding Remarks

The Service Modeling Language (SML) is presented as an example of exploring standardization while research and validation of the service modeling concepts are ongoing. The orientation of SML towards the business user (enterprise engineer, designer) represents the main benefit compared to other approaches of modelling service messages or the interchange. There is no language, international standard, for the modeling of service system. The technical approach of MDSEA builds on the combination and reuse of several existing architectures and models, in different languages, as well as on model exchange between the different modelling levels.

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