IWEI 2011 International Working Conference on Enterprise Interoperability – Interoperability and Future Internet for next-generation enterprises,

held in Stockholm/Sweden, 2011-23/24.

Conference Summary

by

Kurt Kosanke, CIMOSA Association, kosanke@cimosa.de

Following a short presentation of the conference organization the conference summary concentrates on the technical content of the papers (except for Keynotes) presented at the conference. For the full papers see the conference proceedings, *Enterprise Interoperability*, Eds Marten van Sinderen, Pontus Johnson, ISBN 978-3-642-19679-9, Springer Verlag.

A general overview of the technical content arranged according to technical aspects precedes the last section that provides a short summary of each paper. The summary of the technical content of the conference papers is presented following the sequence of the conference program.

1) Overall content of the conference

Part 1 of this summary organizes the theme of the papers according to their main subject (for summary of the referenced paper see part 2 of this section). Paper identification is according to part 2 numbering and the Paper title (underlined) is repeated.

Interoperability (3 papers)

Towards Pragmatic Interoperability in the New Enterprise - A Survey of Approaches attempts to identify and relate the key concepts in PI from proposed definitions and identify critical knowledge gaps in PI research. PI is on the compatibility between the intended versus the actual interoperability and goes beyond the compatibility between the structure and the meaning of shared information, considering the use of information in a given context as an equally important aspect. *[10]*

Contexts for Concepts: Information Modeling for Semantic Interoperability that the 'vertical' bias of today's conceptual information modeling practice diverts models from meeting the new, 'horizontal' need. As an alternative, a conceptual information modeling approach is described that is simultaneously unconventional as well as interoperable with existing approaches. The key to this approach is conceptual context-awareness based on ideas from the work on meta-patterns. *[11]*

Agent-Supported Collaboration and Interoperability for Networked Enterprises presents a framework for enterprise interoperability and enterprise collaboration that adopts a modeling approach for the description and execution of business processes. This enables to describe the interaction protocols that should be used at an intuitive level and to transform the model down to executable code. *[15]*

Interoperability Requirements (1 paper)

An approach for interoperability requirements specification and verification defines, formalizes and analyzes a set of interoperability requirements that each partner of a collaborative process has to satisfy prior to any collaboration. Focus is on How interoperability requirements related to the static and dynamic aspects of the collaboration may be formalized and verified by the use of a formal verification technique. An application case is presented. *[7]*

Ontology (2 papers)

A manufacturing Core Concepts Ontology for Product Lifecycle interoperability identifies a core set of manufacturing concepts and their key relationships that will support product life cycle interoperability across the design and production life cycle. Three different levels of specialization have been identified: generic, product lifecycle generic and domain specific level. *[1]*

Anatomy of the Unified Enterprise Modelling Ontology presents and discusses ongoing work on reformulating the UEML ontology as an OWL2 DL ontology, the Unified Enterprise Modelling Ontology. The Unified Enterprise Modelling Language (UEML) aims to become a hub for integrated use of enterprise and information systems models expressed in different languages. The UEML ontology is a central part of this hub into that modelling languages and their constructs can be

mapped, so that precise semantic relations between the languages and constructs can be established. *[12]*

Modelling Language (1 paper)
A Modeling Language for Interoperability Assessments is coupled with a probabilistic mechanism for automated interoperability assessments of the models created. Interoperability is understood as the probability that two or more actors will be able to exchange and use that information. An example of how the language can be applied is presented. *[5]*

Model Transformation (1 paper)
A Construction Approach of Model Transformation Rules Based on Rough Set Theory for semi-automatic construction of those rules for transformations between different meta-models is described. The method has been validated. *[2]*

Process Interoperation (1 paper)
A Process Interoperability Method for SMEs based on a SMEs oriented 5-level framework (Presentation, Business, Process, Service and Data). The approach mainly solves two types of interoperability between processes and interior to the process. Life cycle of process level interoperability is redesigned and reorganized. A case study is used to describe and enhance the approach. *[4]*

Interoperability Services (5 papers)
Development of Innovative Services Enhancing Interoperability in Cross-organizational Business Processes for detection of interoperability gaps in such processes (European project COIN FP7-216256). *[6]*
Third Party User Interaction Control in SIP Networks, investigates capabilities for OSA (Open Service Access service platform) third party control on user interactions in multimedia networks with session management based on Session Initiation Protocol (SIP). The focus is on the interoperability between OSA application control on session-related user interactions and media services in SIP networks. A formal approach to functional verification of an OSA gateway is proposed. *[3]*
On the move to Business-Driven Alignment of Service Monitoring Requirements, describes a framework for alignment of service monitoring requirements is introduced that allows for treating monitoring as a service. Framework concepts have been applied in a business case. *[8]*
A Trust Model for Services in Federated Platforms for a trust evaluation system. The model exploits services semantics and takes into account last service updates, consistency rules based on the semantic relationships between aspects and other specific calculations for each parameter. *[9]*
Model-Driven Development of Service Compositions for Enterprise Interoperability a MDA-based transformation technique for service composition supporting enterprise interoperability by service composition at two different technical levels, namely at choreography and orchestration level and contributing to the management of changes by defining a (semi-)automated transformation from choreography to orchestrations. An example illustrates the usability of the approach. *[13]*
A data-centric approach for privacy-aware business process enablement deals with the inclusion of internal and/or external services in a business process that contains data handling policies. In a collaborative environment, when business processes include services from outside the company's domain and therefore cannot easily be aligned with existing rules/policies. *[14]*

2) Paper content
The following pages provide short summaries of the conference papers presented in the different parts of the conference proceedings:

[1] A manufacturing core concepts ontology for product lifecycle interoperability; *Zahid Usman et al* propose a manufacturing core concepts ontology (MCCO) aimed at providing support for product life cycle interoperability across the design and production life cycle. MCCO identifies a core set of manufacturing concepts and their key relationships where semantics are formally captured using logic, rules and axioms. Three different levels of specialization have been identified i.e. generic, product lifecycle generic and domain specific level. Each level provides an immediate route

to interoperability. A successful initial experimental implementation has been done to demonstrate the working of MCCO.

Keywords**:** semantics, core concepts, interoperability, manufacturing ontology, knowledge sharing, product lifecycle, design and production

[2] A Construction Approach of Model Transformation Rules Based on Rough Set Theory, *Jin Li et al* propose a rough set based approach to semi-automatically construct transformation rules. The approach of rough set is improved in order to support the transformations between different meta-models. The corresponding algorithm to construct transformation rules is presented. Measurement indicators of transformation rules to support selecting proper rules from many rules which meet transformation requirement are presented as well. The method has been validated by three kinds of experiments for problems with distinct complexity and size.

Keywords**:** Model transformation, Model transformation rules, Rough set theory

[3] Third Party User Interaction Control in SIP Networks, *I. Atanasov, E. Pencheva* investigate the capabilities for OSA (Open Service Access service platform) third party control on user interactions in multimedia networks with session management based on Session Initiation Protocol (SIP). The focus is on the interoperability between OSA application control on session-related user interactions and media services in SIP networks. OSA user interaction interfaces are mapped onto SIP signaling. The behavior of the OSA gateway is modeled by synchronization of application view on user interaction call and SIP session involving media resources. A formal approach to functional verification of OSA gateway is proposed.

Keywords: Open Service Access, Media services, Interface to protocol mapping, Formal testing of functional behavior

[4] A Process Interoperability Method for SMEs, *C. Liu et al* focus their work on enterprise process level interoperability of SMEs (Small and Medium-sized Enterprises) based on a SMEs oriented 5-level framework (Presentation, Business, Process, Service and Data). The approach mainly solves two types of interoperability between processes and interior to the process. Life cycle of process level interoperability is redesigned and reorganized. In each phase of the life cycle a comprehensive solution is given. A case study is used to describe and enhance the approach.

Keywords**:** Enterprise interoperability, SMEs, process interoperability

[5] A Modeling Language for Interoperability Assessments, *J. Ullberg et al* present a modeling language specifically for interoperability issues where interoperability is defined as the probability that two or more actors will be able to exchange information and use that information. The language is coupled with a probabilistic mechanism for automated interoperability assessments of the models created. The paper also presents an example of how the language can be applied.

Keywords: Interoperability, Modeling Language, Interoperability Assessment

[6] Development of Innovative Services Enhancing Interoperability in Cross-organizational Business Processes, *S. Huber et al* present the vision and ongoing results of the COIN (FP7-216256) European project for the development of collaborative and cross-organizational business process interoperability. Services for selectively publishing parts of private business processes are developed that enable the creation of a cross-organizational business process (CBP). Gap detection services provide analysis of the CBP with regards to interoperability gaps like potential deadlocks.

Keywords: Cross-organizational business processes, process interoperability, private-to-public transformation, interoperability gap detection, BPMN, SBVR

[7] An approach for interoperability requirements specification and verification *S. Mallek et al* aim to define, formalize and analyze a set of interoperability requirements that each partner of a collaborative process has to satisfy prior to any collaboration. Focus is on How interoperability requirements related to the static and dynamic aspects of the collaboration may be formalized and verified by the use of a formal verification technique. An application case is presented.

Keywords: interoperability, interoperability requirements, compatibility, interoperation, verification, model checker, conceptual graphs, collaborative process.

[8] On the move to Business-Driven Alignment of Service Monitoring Requirements, *P. de Alencar Silva and H. Weigand* argue that service monitoring should be primarily thought of as an economic concern, with proper needs being elicited on the business strategy level and further drilled down to process and IT services management layers. Monitoring needs and capabilities should be designed independently from each other and exposed as abstract monitoring interfaces for match-

making. This allows for treating monitoring as a service, with more flexibility and adaptability to fulfill specific business needs. A framework for alignment of service monitoring requirements has is introduced, concepts of which have been applied in a business case.

Keywords: Early Requirements Analysis, Monitoring as a Service, Value Models.

[9] A Trust Model for Services in Federated Platforms, *F. J. Nieto* presents an extensible model for a trust evaluation system. It determines some parameters important in enterprise and Future Internet environments and it defines how to calculate the perceived trust by applying a three round algorithm with fuzzy logic. The model exploits services semantics and it takes into account last updates about the service, consistency rules based on the semantic relationships between aspects and other specific calculations for each parameter. Semantics are also used as for sharing information with other platforms and federations for improving interoperability in distributed environments.

Keywords: trust; model; security; web services

[10] Towards Pragmatic Interoperability in the New Enterprise - A Survey of Approaches, *C. H. Asuncion and M. J. van Sinderen* report on advances of Pragmatic interoperability (PI) - the compatibility between the intended versus the actual interoperability as a new research agenda. PI is timely in today's new enterprises as it is increasingly important that organizations are able to collectively add value to their products and services through effective collaboration. When enterprise systems exchange information, PI goes beyond the compatibility between the structure and the meaning of shared information. It also considers the use of information in a given context as an equally important aspect. As PI is a relatively new domain, this paper attempts to elucidate its notion by identifying and relating its key concepts from proposed definitions, and by reviewing extant approaches to identify critical knowledge gaps in PI research.

Keywords: enterprise interoperability, pragmatic interoperability, survey of approaches

[11] Contexts for Concepts: Information Modeling for Semantic Interoperability, *P. O. Luttighuis et al* argue that the 'vertical' bias of today's conceptual information modeling practice diverts models from meeting the new, 'horizontal' need. As an alternative, a conceptual information modeling approach is described that is simultaneously unconventional as well as interoperable with existing approaches. The key to this approach is conceptual context-awareness. It is based on ideas from the work on meta-patterns.

Keywords: enterprise interoperability, semantic interoperability, conceptual

[12] Anatomy of the Unified Enterprise Modelling Ontology, *A. L Opdahl* presents and discusses ongoing work on reformulating the UEML ontology as an OWL2 DL ontology, the Unified Enterprise Modelling Ontology (UEMO). The Unified Enterprise Modelling Language (UEML) aims to become a hub for integrated use of enterprise and information systems models expressed using different languages. A central part of this hub is an extendible ontology into which modelling languages and their constructs can be mapped, so that precise semantic relations between the languages and constructs can be established by comparing their ontology mappings.

Keywords: Ontology, ontological analysis and evaluation, Unified Enterprise Modelling Language (UEML), Unified Enterprise Modelling Ontology (UEMO), OWL2, description logic.

[13] Model-Driven Development of Service Compositions for Enterprise Interoperability, *R. Khadka et al* propose an MDA-based transformation technique for service composition. The contribution of the paper is two-fold: i) enterprise interoperability is supported by service composition at two different technical levels, namely at choreography and orchestration level, ii) it contributes to the management of changes that affect enterprise interoperability, by defining a (semi-)automated transformation from choreography to orchestrations in which the interoperability constraints specified at the choreography level are preserved. A Build-To-Order application scenario, is used as an example to illustrate the usability of the approach.

Keywords: SOA, MDA, Metamodel Transformation, Enterprise Interoperability, Choreography, Orchestration, Service Composition, Service Interoperability

[14] A data-centric approach for privacy-aware business process enablement, *S. Short and S. P. Kaluvuri* propose an approach for dealing with the inclusion of internal and/or external services in a business process that contains data handling policies. In a SOA context, enterprises can use workflow technologies to orchestrate available business processes and their corresponding services and apply business rules or policies to control how they can be used and who can use them. This becomes more complex in a collaborative environment, when business processes include services

from outside the company's domain and therefore cannot easily be aligned with existing rules/policies.

Keywords: privacy; policy; BPM; SOA; web services

[15] <u>Agent-Supported Collaboration and Interoperability for Networked Enterprises</u>, *I. Zinnikus et al* present an agent-supported framework for improving solutions for enterprise interoperability and enterprise collaboration. The work is part of the European project COIN. The project is briefly presented and its basic approach and system architecture are explained. Special emphasis is put on how agents can support enterprise interoperability as well as enterprise collaboration services. The framework adopts a modeling approach for the description and execution of business processes. With this a system engineer can describe the interaction protocols that should be used at an intuitive level and transform the model down to executable code. Private partner processes can be integrated using a mapping approach to bridge technical interoperability gaps.