I-ESA conference on Interoperability for Enterprise Software Applications (I-ESA) held in Beijing, 2009-04-20/22.

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 "Interoperability for enterprise software and applications" ISBN 978-0-7695-3652-1, published by Conference Publishing Services.

The summary of the technical content of the conference is divided into two parts. A general overview of the technical content arranged according to technical aspects precedes the last section that provides a short summary of each paper. This section is arranged according to the conference program.

Conference Organisation

The first day of the conference was devoted to a total of five workshops organized by different groups addressing the following themes: WS 1: *Enterprise Interoperability for SMEs*, WS 2: *Roadmap of Enterprise Interoperability*, WS 3: *Interoperability for Public Administration and e-Invoicing*, WS 4: *Common Standards or Divided Markets in ICT: the EU and China*, WS 5: *Collaboration for Interoperable Systems*.

At the second and third day a total of 54 papers have been presented with 5 invited keynotes and 49 papers held in 6 tracks with up to 3 sessions each.

Keynotes papers have been presented by:

- G. Santucci, European Commission, *"Towards a Science Base for Enterprise Interoperability in the Future Internet of Services"*
- *G.* Dai, Ministry of Science and Technology of People's Republic of China, *"Overview and Expectation on Development of China 863 High-Tech R&D Programme and Manufacturing Informationization"*
- C. Wu, Tsinghua University , China, *"Federation integration for networked collaborative designing and manufacturing-Interconnection, Intercommunication Interoperation between Enterprises"*
- K. Popplewell, Coventry University, UK, *"Enterprise collaboration and the future internet – crossing the divide from information space to the real world"*
- S. Gusmeroli, TXT e-solution, *"Enterprise Interoperability and Enterprise Collaboration in the Future Internet: the COIN Research Integrated Project"*
- Y. Huang, IBM, China, *"Web-based delivery of business services: opportunities, challenges and future"*

The sessions of the 6 conference tracks addressed a large number of interoperability related subjects ranging from

i) **operational aspects** like *Business Interoperability*, *Cross-organizational Collaboration and Cross-sectoriel Processes*,

ii) **enterprise system design** aspects like *Systems Engineering in the Context of Interoperability, Architectures and frameworks for interoperability & EI-Roadmaps*, *Enterprise Modeling for Enterprise Interoperability*, *Ontology Based Method for Business Process Integration, Semantics for Enterprise Interoperability, Specification and Implementation of Interoperability & Enterprise Modeling for Enterprise Interoperability*,

iii) **support system design** aspects like *Approaches and Solutions for Model Driven Architectures and Interoperability*, *Platforms for Enterprise Interoperability*, *Service Oriented Architectures for Interoperability*, *Design and Execution of Interoperable Services*, *Interoperability Scenarios and Case Study & Enterprise Modeling for Enterprise Interoperability*, and

iv) **education related** aspects like *Education on Enterprise Interoperability & Approaches and Solutions for Model Driven Architectures and Interoperability*.

Paper summaries

1) Overall content of the conference

Part 1 of this section organizes the theme of the papers according to their main subject (for summary of the referenced paper see part 2 of this section)

Interoperability problems - 2 papers:
"ICT-based communication and information exchange type interoperability problems explicitly in simultaneous business and product development"*[3]* and "Information exchange in a marine logistics service platform where several interoperability issues like data transformation, data synchronization, private data sharing and resource matching are briefly discussed*[21]"*.

Interoperability - general concepts - 2 papers:
"Using systems science in enterprise interoperability and the discussion of main systemic concepts and system properties lead to the definition of an ontology of enterprise interoperability that incorporates concepts identified in the framework for interoperability (part of ISO 11354)"*[15]* and "A framework (5Steps® Road mapping) to design and manage organisational interoperability, introduces the concept of "organizational capabilities"*[17]*.

Interoperability support – ontology oriented - 9 papers addressing a wide range of interoperability support from:
general support: "Ontology-based approach for dealing with the business level of the Model-Driven Engineering approach for interoperability"*[8]*; "Searching method based on fuzzy clustering to aggregate and unify information from on-line ontologies relating to e-commerce websites"*[44]*.; and "Ontology-based framework for developing an e-business transactions repository that is web-based"*[9];* over
ontology applications*:* "Federation oriented enterprise interoperability concept using Short-Lived Ontology"*[47];* "Meta-model for the registration of structural and evolutionary information about ontologies with reference to ISO/IEC 19763-3 (MFI-3 Meta-model for Ontology Registration)"*[7];* "Ontology Based Method for Business Process Integration"*[19]*, "Ontology model to support supply chain process modelling"*[33],* "Semantic enrichment of enterprise models"*[36];* "Ontology-based information retrieval framework to effectively search engineering information in various documents considering the semantics of the information *[39]*" to
education on ontologies*:* "Characteristics of ontologies and formulated criteria for the success of an ontology creation methodology for domain experts"*[26];* "Rules driven ontology learning approach from Object-Relational Databases extracting ontologies from Object-Relational Databases based on the Semantic Objects platform)"*[24]*.

Interoperability support – service oriented - 6 papers present subjects addressing frameworks, languages, Meta models and different approaches to enable interoperability:
"Interoperability framework (Hong Kong e-government) for cross-department joined-up government services with two parts: (1) definition of a set of recommended technical specifications, (2) a framework for formulating and managing XML message standards for data exchange*[34]*"; "Service oriented architecture modeling language to achieve organisational interoperability by matching of goals and services and to serve for describing the realization of business process interoperability supporting semantic and technical service interoperability*[38]"*; "Meta-model for process model registration of business process and Web service in a unified and normative manner and enable their semantic interoperation *[48]"*. "On-demand semantic interoperability support for aggregating

services, provided by Connecting Ontologies driven by user requirements *[4-2]"; "*Standardized B2B integration approach based on web services for public and private processes*[43]"; "*Approach for comparing two architectures for ontology-based semantic annotation for service interoperability*[13]"*.

Interoperability support – platform oriented - 2 papers:
"Grid technology platform to realize sharing of resources without disclosing all details to collaborating partners solves three interoperability issues: modeling interoperability, interoperability between different services and interoperability between Windows and Linux systems*[16]"* and "Requirements for an e-mail based interoperability solution tailored for SMEs*[35]"*.

Interoperability support – decision oriented - 2 papers:
"Enterprise decision support system that delivers operation performance levels at continuously, using different performance indicators*[1]"* and "Foundations for introducing a decision support model into a model-driven interoperability architecture for services*[31]"*.

Enterprise modelling - 3 papers:
"MOF based enterprise model extending technology and architecture for enterprise modeling tools *[11]"; "H*ybrid method combining IEM (Integrated Enterprise Modeling) methodology and high level Petri nets to provide formal semantic definitions of the model content*[18]"* and "BPMN-based business process meta-model, from which business process models can be generated that provide web service characteristic and automatic translation of BPMN to BPEL*[29]"*.

Software Development – 8 papers:
"Software development method for enterprises based on Model-Driven Architecture and the Component Based Software Development method to decrease development and implementation time, improve flexibility and provide for cooperation between different systems*[12]"; "*Replication Strategy based on Clustering Analysis to confirm the correlation among the data files accessed according to the access history of users and to pre-fetch and buffer the corresponding file sets *[14]"; "*Aspect-Oriented Modeling (AOM) approach to analyze performance of JCA (Java Connector Architecture)-based systems*[20]"; "A*utomatically synonymous matching framework *[25]";* Sem-library to provide effective keyword proximity queries to express abundant domain knowledge in a domain software component library*[27]"; "N*ew tree-topology maintenance policy based on the PeerCast protocol and a peer-to-peer live media streaming system *[25]*"; "Framework for heterogeneous knowledge management systems with focus on discovery and representation of individual/entity capabilities and their composition in heterogeneous knowledge representation environments*[32]"* and *"B*asic concepts in SOA (Service Oriented Architecture) and JBI (Java Business Integration) specification*[49]"*.

Application software – manufacturing enterprise oriented - 2 papers:
"Multi-objective integrated progress control with the indexes of duration, cost and quality integrated into the scheduling plan*[2]*"; Software component library to support the development process of ERP systems*[5]"; "*Collaborative Resource Planning that integrates the mechanisms and the internal operation planning in a ONE-of-a-Kind production*[6]"; "C*onceptual framework that provides all the aspects that have to be considered in the modelling a Collaborative Order Management process*[10]" and "*Assembly process micro-planning for computer aided assembly process planning and simulation in two cooperative processes in large and complex product manufacturing operations such as airplane or a ship building*[23]"*.

Application software – service oriented - 2 papers:
"Lifecycle service quality assurance approach to assist service providers in building better quality service system *[4-1]"* and "SOA based framework for service ability description and a selection method for application integration in the manufacturing domain*[30]*.

Application software – internet oriented - 1 paper:
"Web-based problem solving environment for weave pattern design in the textile industry*[22]"*.

General - 2 papers:
"Underlying concepts involved in the creation of a collaboration culture within a team*[33]";* "Taxonomy of mobility-related requirements and discuss mobility as an additional quality factor of information systems*[40]";* "Semantic similarity computing to resolve ambiguity issues caused by the use of synonyms or homonyms*[41]"* "Requirements of a healthcare interoperability framework to enhance enterprise architecture interoperability of healthcare organizations, while maintaining the organization's technical and operational environments, and installed technology*[42]";* "Knowledge sharing system framework based on web service technology*[45]"* and "Pro-Active Project Management methodologies and the technologies that enable its implementation*[46]"*.

2) Paper content

The following pages provide short summaries of the conference papers presented in the different sessions of the conference:

T1-1 Business Interoperability
[1]Contribution to Interoperability of Decision Support Systems Focusing on the Data Recovery Process, Guillaume Vicien et al propose an enterprise decision support system that delivers operation performance levels at continuously, using different performance indicators. This is achieved through data models that facilitate a data recovery process improvement during the system conception phase due to the definition of a performance indicator system.
[2]The Method of Multi-objective Integrated Progress Control on Aviation Project, Yan Zhen-guo et al propose a method for integrated progress control in an aviation manufacturing projects. A model of integrated progress control was developed, in which the indexes of duration, cost and quality are integrated into the scheduling plan. Based on the Manufacturing Bill of Materials (M-BOM), the integrated multi-objective schedule was generated by using Work Breakdown Structure (WBS) and multi-layer network planning techniques. The simulation of an aircraft assembly project demonstrates the effectiveness of the method.
[3]Interoperability Issues in the Field of Innovation Management, Thomas Knothe & Roland Jochem report on ICT-based communication and information exchange type interoperability problems related to simultaneous business and product development that have been experienced in a benchmarking study carried out between four major companies in Germany. An overview of the new research project "IsyProM" (German national funded), is presented that is aimed on further analysis of such interoperability issues. The project employs POP* - a modelling methodology resulting from the European project ATHENA.

T1-2 Service Oriented Architectures for Interoperability I
[4-1]A SQFD approach for Service System Design Evaluation and Optimization, Shu Liu et al propose SQFD (Service Quality Function Deployment), a lifecycle service quality assurance approach, to assist service providers in building better quality service systems. SQFD adopted the QFD approach in build-time service quality design, but extended it into run-time performance monitoring and evaluation and bottom-up system optimization. As a fundamental element of SQFD a model of service quality indicators is also presented in the paper.
[4-2]Towards Service-oriented Semantic Interoperability Based on Connecting Ontologies, Jian Wang et al propose Connecting Ontologies (CO) driven by user requirements, as a new method to provide on-demand semantic interoperability support for aggregating services. An example in the urban transportation domain is given to illustrate the method.
[5]Component Library-based ERP Software Development Methodology, Song He et al discuss the use of a software component library to support the development process of ERP systems. Using a researching component library-based software development (CLBSD), the ERP functions are decomposed into component requirements. According to component requirements, components can be

retrieved from the component library. With these components, it's convenient to assemble a whole ERP system guided by a main framework component level diagram.

T1-3 Cross-organizational Collaboration and Cross-sectoral Processes I

[6]A Collaborative Operation Framework for Ship-building Supply Chain, Lanshun Nie et al propose a Collaborative Resource Planning (CORP), which integrates the mechanisms and the internal operation planning in a ONE-of-a-Kind production. A software system implementing the CORP framework has been developed to support the collaboration and synchronization across enterprises involved in the shipbuilding process. Results from an application in a ship-building supply chain indicate significant improvements in work coordination and synchronization.

[7]MFI-3: An Enable for Semantic Interoperation Between Enterprise Information Resources, He Yangfan et al explain the rational for MFI-3 and illustrate its usage in the semantic interoperation between enterprises. ISO/IEC 19763-3 (MFI-3 Meta-model for Ontology Registration) provides a meta-model for the registration of structural and evolutionary information about ontologies. It helps to eliminate the "blind spots" phenomenon in the ontology searching process caused by language inconsistencies or technical jargon.

[8]Prototype of an Ontology-based Approach for Collaborative Process Specification, V. Rajsiri et al present an ontology-based approach for dealing with the business level of the MDE (Model-Driven Engineering) approach for interoperability. Both ontologies and deduction rules are used to automate the specification of BPMN (Business Process Modeling Notation) that are to be employed in collaborative processes for business networks. The authors propose to work at a higher abstraction level than the CIM (Computer Independent Model) for capturing knowledge on collaboration from business partners and use the MIT Process Handbook as a start before moving down to the CIM. A prototype has been developed demonstrating the approach.

T2-1 Enterprise Modeling for Enterprise Interoperability I

[9]E-Business Transactions Modeling; An Ontology-based Repository, Aikaterini Maria Sourouni et al present a cohesive ontology-based framework for developing an e-business transactions repository that is web-based, in which interoperable transactions of heterogeneous business domains are going to be modelled (cross-sector and cross-border). This repository will provide for formal description, composition and publishing of traditional, electronic, or web services, together with the relevant documents, rules and process descriptions in an integrated schema. A research type pilot implementation has been used to verify the concepts described

[10]A Conceptual Framework for Modeling the Collaborative Order Management (COM) Process, F. Alarcón et al introduce a conceptual framework that provides all the aspects that have to be considered in the modelling of a COM process. Main content of the framework: definition of a glossary of terms, identification of main sub-processes and characteristics, and recognition of process modelling issues regarding the COM process. This framework is considered as a future research line for the development of a modelling methodology for COM processes.

[11]Design and Implementation of a MOF Based Enterprise Modeling Tool, Li Jin et al propose a MOF based enterprise model extending technology and architecture for enterprise modeling tools to support building enterprise models, which are integrated, comprehensive, precise, domain specific, describing enterprise in suitable levels and granularity of abstraction, and covering necessary aspects. The tool architecture includes four layers, representing the MOF concepts (M3 Layer), the tool Meta model (M2 Layer), the enterprise model (M1 Layer) and the model instance (M0 Layer). The architecture provides the capability of defining enterprise modeling languages and building understandable, domain specific enterprise model by combining several modeling languages. A body assembly model for the ship-building industry has been built and tested successfully.

T2-2 Approaches and Solutions for Model Driven Architectures and Interoperability I

[12]Research on Computational Independent Model in the Enterprise Informationization System Development Mode Based on Model Driven and Software Component, Y. Che et al propose a software development method for enterprises based on MDA (Model-Driven Architecture) and the CBSD (Component Based Software Development) method to decrease development and implementation time, improve flexibility and provide for cooperation between different systems. Based on this architecture, the authors studied in detail the meta-models in CIM (Computational Independent

Model) layer. The CIM model is divided into two layers: global model layer composed of the global business analysis model (G model) and the global business model (GB model) and business model layer, including the function/process model, the organization model and the information model. Relations between the two layers are: function/organization frame is mapped from G model to business model, and business logic/information frame is mapped from GB model to business model.
[13]Model Driven Service Interoperability through Use of Semantic Annotations, Arne-Jørgen Berre et al present an approach for comparing two architectures for ontology-based semantic annotation for service interoperability, the EMPOWER architecture using platform specific XML-based technologies and the MEMPOWER architecture extending this with platform independent Model Driven Architecture (MDA) based technologies. The authors compare the two architectures with respect to pilot requirements and experienced advantages and challenges for model driven systems. The two approaches are being evaluated based on examples from interoperability between ERP-systems in a Buyer/Seller interaction context.
[14]Research on Data Interoperability Based on Clustering Analysis in Data Grid, Gui Liu et al propose a strategy called Replication Strategy based on Clustering Analysis (RSCA), which confirms the correlation among the data files accessed according to the access history of users and pre-fetches and buffers the corresponding file sets. The experimental results show that RSCA is effective and has reduced the average response time of client nodes as well as the bandwidth consumption.

T2-3 Architectures and Frameworks for Interoperability & EI-Roadmaps
[15]Systems Science for Enterprise Interoperability, Yannick Naudet et al discuss the use of Systems science in Enterprise Interoperability (EI). Starting from General Systems Theory, the authors review and discuss main systemic concepts, highlight system properties important for interoperability and potential solutions to deal with related issues at a systemic level. An ontology, which grounds the existing Framework for Enterprise Interoperability (CEN/ISO 11354) within a systemic model is proposed. This ontology provides a basis for system modelling by identifying barriers and solutions related to EI that might be exploited in a systemic enterprise modelling process for diagnosis or decision-aid in establishing interoperability.
[16]Grid Technology Support Information and Application Service Interoperability, Cui Degang et al developed a Grid technology platform to realize sharing of resources without disclosing all details to collaborating partners. This technology solves three interoperability issues: modeling interoperability, interoperability between different services and interoperability between Windows and the Linux operational systems. The platform has been tested using an application in the aviation industry.
[17]Designing and Managing Organizational Interoperability with Organizational Capabilities and Roadmaps, Philippe Rauffet et al discuss organizational interoperability issues observed in the study of two cases. A framework (5Steps® Roadmapping) is presented that can help to design and manage organisational interoperability, by driving the development of "organizational capabilities". Organizational capability can be defined as "know how to act", a potential of action, resulting from the combination and the coordination of "action levers" (resources, knowledge and competencies) of the organization.

T3-1 Enterprise Modeling for Enterprise Interoperability II
[18]A Petri-net-based Simulation and Optimization Approach for IEM and EI, Xiaofeng Liu et al present a hybrid method combining IEM (Integrated Enterprise Modeling) methodology and high level Petri nets to provide formal semantic definitions of the model content. With focus on the process flow, the formalized definitions of the basic IEM model are given and the rules for mapping it onto Petri nets for all IEM elements are defined. The mapped Petri net is built and programmed with the CPN tool and CPN ML. The simulation result shows that the mapping from the basic IEM model onto Petri nets is unambiguous and the analyzing result based on high-level Petri net can effectively support optimizing IEM model in return.
[19]An Ontology Based Method for Business Processes Integration, S. Fan et al propose a method that adopts ontology as the carrier of business processes. Translating business process models into business process ontologies represented by OWL-S, ontology mapping and integration techniques are adopted to bridge the semantic gaps among organizations, and to integrate related processes into an organic process by eliminating redundancies and recomposing the processes after elimination.

[20]An Aspect-Oriented Modeling Approach to Predict Performance of JCA-based Systems, Wenbo Zhang et al provide an Aspect-Oriented Modeling (AOM) approach to analyze performance of JCA (Java Connector Architecture)-based systems. Different JCA connector designs are modeled as crosscutting concerns, and can be separately woven with a primary UML model of the system as solvable LQN performance models. The authors have applied AOM to characterize connectors, and predicted the performance effects of them on the overall system performance.

T3-2 Design and Execution of Interoperable Services

[21]Architectural Design of BIRIS-based Marine Logistics Service Platform and Related Interoperability Issues, Zhongjie Wang et al investigated current state and business requirements in marine logistics. BIRIS (bilateral resource integration service) was chosen for the marine logistics service platform. The architectural design of the BIRIS-based platform, key business services and a set of software web services are presented. Choreographic scenarios of business services are demonstrated to illustrate their use. Several interoperability issues in this platform like data transformation, data synchronization, private data sharing and resource matching are briefly discussed.

[22]A Web-based Problem Solving Environment for Weave Pattern Design, Peng Gao et al propose a web-based problem solving environment for weave pattern design in the textile industry. Contribution to a PSE (Problem Solving Environment) platform are in providing a SaaS-type application model and SaaS-type application integration into the PSE. The PSE architecture and a SaaS-type application model are described in details as well as SaaS-type application implementations into the PSE.

[23]A Cooperative Method Between Assembly Process Planning and Simulation for Complex Product, Dong Liang et al propose an Assembly Process Micro-planning (APMP) for computer aided assembly process planning and simulation in two cooperative processes in large and complex product manufacturing operations such as airplane or a ship building. The four levels of APMP (assembly job, assembly task, assembly operation, assembly action) are described using the Process Specification Language (PSL - ISO 18629) that enables information transfer and sharing between the two process areas.

T3-3 Semantics for Enterprise Interoperability

[24]Rules Driven Object-Relational Databases Ontology Learning, Jia Chen et al propose a rules driven ontology learning approach from Object-Relational Databases (ORDB). The method extracts ontologies from Object-Relational Databases based on the Semantic Objects (SO) platform. A set of rules will select the basic elements that the Web ontology language (OWL) needs. Based on the rules, the RDOL (Rules Driven Ontology Learning) model is proposed that will generate an ontology. The approach reduces about forty-two percent learning time and obtains about eighteen percent higher performance compared with ontology learning using Relational databases (RDB).

[25]Complex Synonymous Matchings Based on Correlation Mining, Liu Jie et al developed an automatically synonymous matching framework that consists of XML documents data preparation, synonymous matching discovery and finally matching selection. The framework incorporates correlation mining and schema matching, and can be used to mine complex m: n matchings beside simple 1:1 matchings. By observing the query interfaces on the Deep Web, the authors found the matched attributes or attribute groups that express the same semantic information but rarely co-occur in the same query interface. This lead to discover a complex synonymous matching by using a correlation mining approach and the development of a new correlation algorithm to ensure the accuracy of synonymous matching.

[26]Towards a User-friendly Ontology Design Methodology, Nikolai Dahlem et al reviewed existing methodologies for ontology creation and accessed their suitability for usage by novice users and domain experts. To provide a unified view the authors analyzed and structured the major characteristics of ontologies and formulated criteria for the success of an ontology creation methodology for domain experts. A list of 10 criteria - adequate terminology, consistency, descriptiveness, error avoidance, expressiveness, hidden formality, look-ahead, robustness, structure and transparency - has been established after empirical evaluation in cooperation with practitioners from both industry and academia.

T4-1 Business Interoperability II

[27]Reusable Components Retrieval Based on Faceted Classification with Sem-Library in Domain Component Library, Cuiyun Fu & Huiyou Chang propose a Sem-library to provide effective keyword proximity queries to express abundant domain knowledge in a domain software component library and release the users from esoteric vocabularies. Sem-Library supports basic semantic relationships and incremental query construction. The concepts have been proven in an experiment.

[28]Research and Implementation of ALM-tree Maintenance Policy Based on PeerCast, Panxiang Zhang et al propose a new tree-topology maintenance policy based on the PeerCast protocol and designed and implemented a peer-to-peer live media streaming system according to this policy. Experience with the ALM (Application Level Multicast) policy show that this algorithm can greatly reduce the influence on QoS (Quality of Service) when peers are joining/leaving sessions.

T4-2 Service Oriented Architectures for Interoperability II

[29]A Service-Oriented Business Process Modeling Methodology and Implementation, Lin Bai & Jun Wei designed and implemented a BPMN-based business process meta-model, from which business process models can be generated that provide web service characteristic and automatic translation BPMN to BPEL. The whole modeling process of the new method is illustrated through a simple case study.

[30]A SOA Based Framework of Service Ability Description and Selection Methods for Application Integration in Manufacturing Domain, Weihua Huang & Xiaoping Li propose a SOA based framework for service ability description and a selection method for application integration in the manufacturing domain. A standard schema is introduced to describe both user requirements and service abilities.

[31]An Architectural Approach for Service Interoperability, Stephan Kassel presents some foundations for introducing a decision support model into a model-driven interoperability architecture for services. Starting from the business domain of a full-service e-commerce provider with a SAAS (software as a service) business model, a service architecture addressing explicitly interoperability issues, and aiming on automatic composition of reliable complex service offerings from well-known service components is described. Additionally, the architecture provides negotiations support between service vendors and service demanding companies.

T4-3 Cross-organizational Collaboration and Cross-sectoral Processes II

[32]Representing and Discovering Capabilities and Their Complementarity, Dong Cheng & Nacer Boudjlida present a framework for heterogeneous knowledge management systems with focus on discovery and representation of individual/entity capabilities and their composition in heterogeneous knowledge representation environments. They define a capability representation language in description logics, propose approaches and algorithms for capability management and discovery and outline the implementation of their proposal in a mediator-based prototype system.

[33]Integrating Process and Ontology for Supply Chain Modeling, Tonci Grubic & Ip-Shing Fan introduce an ontology model developed to support supply chain process modelling. This work explicitly defines the generic business processes relevant to supply chain operations, describes the creation of the information model to support the information exchange needs and develops the related ontology. The latter was tested in three industry case studies. The paper introduces the overall ontology development approach together with some of the findings that summarize the experiences in developing the ontology model.

T5-1 Interoperability Scenarios and Case Study & Enterprise Modeling for Enterprise Interoperability III

[34]E-government Data Interoperability Framework in Hong Kong, Thomas Y. Lee et al discuss about the second part of the interoperability framework, a Hong Kong e-government initiative launched in 2003. The framework facilitates the implementation of cross-department joined-up government services and comprises two parts: (1) definition of a set of recommended technical specifications as a single point of reference for departments and contractors to implement joined-up projects, (2) a framework for formulating and managing XML message standards for G2G and G2B

data exchange, mainly on XML Schema and Design Guide, and its real life applications. The framework identifies three dimensions of interoperability: technical, data and process interoperability.
[35]An Email-based Interoperability Approach for SMEs, Thomas Burkhart et al develop an adequate definition for Process Interoperability (PI)

> *Process interoperability is the ability of an enterprise to synchronize, partially control and integrate continuous series of enterprise tasks (i.e. business process parts) that are governed and executed outside of its own enterprise borders without the need to modify its own organizational and technical environment.*

and show how PI can help SMEs to conduct their business. The authors derive the requirements for an interoperability solution tailored for SMEs and introduce a three-layered interoperability approach (system, semantic and process interoperability layer) in the context of the European Project ”Commius” that enables SMEs to collaborate easily on the level of PI using simple email communication. The concept has been tested in a case study.
[36]Semantic Enrichment of Enterprise Modeling - Use of Ontology, Nabila Zouggar et al aim at contributing to the development of semantic enrichment of enterprise models. Problems of application of enterprise modelling languages are due to semantic inconsistencies leading to enterprise interoperability. Using an ad-hoc approach to enrich the model by using a reference ontology, the authors demonstrate their approach by describing two illustrative examples.

T5-2 Education on Enterprise Interoperability & Approaches and Solutions for Model Driven Architectures and Interoperability II
[37]Solving the Human Problem: Investigation of a Collaboration Culture, Gilles Gautier et al explore the underlying concepts involved in the creation of a collaboration culture within a team. Starting from the Maslow Hierarchy the authors follow a formal approach by drawing on motivation, group building and schema theories to identify the core elements of such a culture. This focus on the social psychological attributes enables the justification that collaboration efficiency can only be reached if groups adopt a common learning/communicative culture, and develop values such as trust and respect. The conclusion of this paper could be used to assess the efficiency of collaborative tools and to enable the teaching of collaboration.
[38]Organizational Interoperability Supported Through Goal Alignment with BMM and Service Collaboration with SoaML, Fenglin Han et al show that the recent OMG standards BMM (Business Motivation Model) and SoaML (Service oriented architecture Modeling Language) can be used by business people to achieve organisational interoperability by matching of goals and provided and required services between interacting organizations. It will also serve as a foundation for describing the realization of interoperability through cross organisational business processes and further realization of IT support with semantic and technical service interoperability. An example of service identification from the Norwegian national Health ICT architecture is provided.

T5-3 Systems Engineering in the Context of Interoperability
[39]Research on Ontology-based Multi-source Engineering Information Retrieval in Integrated Environment of Enterprise, Yuangang Yao et al present an ontology-based information retrieval framework to effectively search engineering information in various documents considering the semantics of the information. The framework identifies ontologies to support document analysis and query processing through information representation in semantic levels, and complete the mapping between user queries and document resources. Still to be addressed in future research: heterogeneous document databases, security demands of information retrieval and implementation of the framework into existent multi-system.
[40]Taxonomy of Mobility-Related Requirements, Sundar Gopalakrishnan & Guttorm Sindre propose a taxonomy of mobility-related requirements and discuss mobility as an additional quality factor of information systems. The taxonomy is to be used as a starting point for guidelines on how to write mobility-related requirements for information systems, as well as a basis for completeness checklists. Structurally, the taxonomy is much inspired by similar taxonomies for safety and security-related requirements. However, the differences between mobility and safety/security implies that other sources also had to be taken into account like discussing the concept of mobility from an IS perspective.

[41]On Measuring Semantic Similarity of Business Process Models, Gao Juntao & Zhang Li use the technologies of semantic similarity computing to resolve ambiguity issues caused by the use of synonyms or homonyms. In particular, the idea of similarity propagation is introduced to pick out a mapping between corresponding activities and data. The Hungarian algorithm is expanded to reduce its time complexity. The similarity of whole VPML (Visual Process Modeling Language) models is measured based on the Jaccard coefficient. In an experiment the method has been evaluated by comparing computerized results with expert judgments. The work has been applied in a project of cross organization ERP implementation.

T6-1 Business Interoperability III

[42]Challenges for the Development of Interoperable Information Systems in Healthcare Organizations, António Grilo et al address the requirements of a healthcare interoperability framework to enhance enterprise architecture interoperability of healthcare organizations, while maintaining the organization's technical and operational environments, and installed technology. The paper advocates the role of the Chief Information Officer (CIO) in dealing with challenges posed by the need to achieve healthcare interoperability at the different layers, and in developing and executing an interoperability strategy, which must be aligned with the health care organization's business, administrative and clinical processes.

[43]Web Service based B2B Integration Framework for Managed Public and Private Process, Cixing LV & Yunlong Zhu present a flexible standardized B2B integration approach based on web services for public and private processes based on an analysis of the challenges of B2B and features of new technologies (web services). The proposed solution includes the following components: (1) B2B Process templates, (2) B2B Service library, (3) Public process manager, (4) Process engine, (5) Human Interface, and (6) Binding component for public and private processes.

T6-2 Platforms for Enterprise Interoperability

[44]Taxonomy Ontology Searching Method Based on Fuzzy Clustering, Zhao Yangyao et al proposed a searching method based on fuzzy clustering to aggregate and unify information from on-line ontologies relating to e-commerce websites. The similarity among different conceptions can be well calculated by fuzzy clustering. Getting the queries from users, this method can both give the final searching answers according to the similarity and arrange these answers in special order that can be defined by users or system designers. A propositional answering method that can reveal the relationship among answers is described using an example from a sports clothes e-commerce.

[45]Study on Knowledge Sharing System for Aviation Product Coordination Design, Zhang Shuang & Li Zhou Ming propose a knowledge sharing system framework based on web service technology. For solving the questions of description and gathering information from distributed and different data resources, a scheme based on the SOA framework was selected. The Apache AXIS2 Web service framework was used to realize the data exchanged middleware using two key technologies: XML knowledge data description and packet technology and automatic data registered technology. A prototype of the knowledge sharing system has been developed and may be applied in the AVICNET of the Aviation Industry Corporation of China to provide a solution for knowledge sharing in aviation product design.

[46]Pro-Active Project Management, Gilles Gautier et al introduce the Pro-Active Project Management methodologies and the technologies that enable its implementation. It finally shows how such a methodology helps achieving efficiency in a project. The technologies necessary for the implementation of the Pro-Active Project Management methodology are being developed and integrated by the European CoSpaces project into a platform aiming at supporting collaborative work.

T6-3 Specification and Implementation of Interoperability & Enterprise Modeling for Enterprise Interoperability IV

[47]Short-Lived Ontology Approach for Agent/HLA Federated Enterprise Interoperability, G. Zacharewicz et al propose an implementation of the federation oriented enterprise interoperability concept, using Short-Lived Ontology. The authors give a review of ongoing research on enterprise interoperability and identify the artificial agent concept and the HLA standard as adequate to support for execution of the studied concept. The authors propose the Agent/HLA framework - Short-Lived

Ontology based to support implementation of distributed enterprise models of the conceptual level and following the federated enterprise interoperability approach (ref. CEN/ISO 11354 added in summary).
[48]Using MPMR to Support Developing Web Service Applications for Enterprises, Chong Wang et al propose a MPMR (Meta-model for Process Model Registration) to register business process and Web service in a unified and normative manner and enable semantic interoperation between them. The registration information can be used to smoothly translate professional business process requirements into the corresponding solution based on Web services. A typical case study in urban transportation demonstrates the practical use of MPMR to support development of Web service applications in a VE.
[49]An Architecture Design of a JBI-Based Enterprise Service Bus, Sui Xin et al introduce some basic concepts in SOA (Service Oriented Architecture) and JBI (Java Business Integration) specification. The authors present an architecture design of a JBI-based EBS (Enterprise Service Bus) implementation named SIA-ESB. The SIA-ESB has the key features of an ESB like message transformation, message transmission, and dynamic message routing. In addition, the SIA-ESB is an open platform that allows third-party components to be used. For example, with the assistance of BPEL service engine, SIA-ESB can also orchestrate business logic.