RESEARCH AND PRACTICAL ISSUES OF ENTERPRISE INFORMATION SYSTEMS
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RESEARCH AND PRACTICAL ISSUES OF ENTERPRISE INFORMATION SYSTEMS

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Edited by

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Preface

The idea for this conference came from a meeting of the IFIP (International Federation for Information Processing) Technical Committee for Information Systems (TC8) in Guimares, Portugal in June 2005. Our goal is to build an IFIP forum among the different Information Systems Communities of TC8 dealing with the increasing important area of Enterprise Information Systems. In this particular meeting the committee members intensively discussed the innovative and unique characteristics of Enterprise Information Systems as scientific sub-discipline.

Hence, in this meeting it was decided by the TC8 members that the IFIP TC8 First International Conference on Research and Practical Issues of Enterprise Information Systems (CONFENIS 2006) would be held in April 2006 in Vienna, Austria. Dr. Li Xu (USA) and Dr. A Min Tjoa (IFIP TC8) were assigned to propose a concept for this conference in order to establish an IFIP platform for EIS researchers and practitioners in the field to share experience, and discussing opportunities and challenges.

We are very pleased therefore to have this conference organised by the help of the Austrian Computer Society (OCG). OCG supports the idea of this conference due to the urgent need of research and dissemination of new techniques in this key area.

We received 180 papers from more than 30 countries for CONFENIS and the Program Committee eventually selected xx papers or extended abstracts, making an acceptance rate of xx% of submitted papers. Each paper was thoroughly reviewed by at least two qualified reviewers.

As an additional feature of CONFENIS we have invited distinguished scholars to present and discuss special aspects relevant for future applications and research. Dr. Prof Gottfried Vossen (University of Münster, Germany), the Director of the European Research Center for Information Systems will give a presentation on service-oriented architecture. Dr. Thomas Li, Director of IBM China Research Laboratory has a keynote speech on continual business transformation technology.

We would like to express our gratitude to all program committee members, workshop organisers and committee members and all the external referees who reviewed the papers very thoroughly and in a timely manner. Due to the high number of submissions and the quality of the submitted papers, the reviewing, and discussion process was an extraordinarily challenging task. We are therefore deeply grateful to many individual reviewers who worked with us so diligently (see list of referees). Without their time and efforts, CONFENIS 2006 and the proceedings would never have come to be.

We would specially like to thank the Chair of IFIP TC8, Professor J. Dewald Roode (South Africa), Vice-Chair Professor David Avison (France), Secretary Professor
Isabel Ramos (Portugal), and former Secretary Professor Jan Pries-Heje (Denmark), for their encouragement and guidance throughout this endeavor. We are very grateful to have the sponsorship of the Vienna University of Technology.

Special thanks are given to Dr. Sohail S. Chaudhry (USA), for his time and efforts in editing the CONFENIS proceeding, as the Managing Editor.

Special thanks must also be given to Dr. Tho Manh Nguyen (Austria) for all his enthusiastic support in the organizing tasks of CONFENIS 2006.

We would also like to thank all the authors who submitted their papers to CONFENIS 2006.

Many thanks go to Ms. Christine Tronigger for providing a great deal of supporting administering the registrations.

Finally we hope that the conference will have a real benefit for innovative approaches, which have to consider the various issues of Enterprise Information Systems, and furthermore will build a platform for further in-depth discussions between researchers in the different EIS-areas.

Professors A Min Tjoa, Prof. Lida Xu (Conference Chairs)
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Keynote Speaker: Dr. Dewald Roode, Chair, IFIP TC8

Dewald Roode obtained a masters degree in theoretical physics and a master's degree in mathematics at the University of Potchefstroom in South Africa. He completed his education by obtaining a PhD at the University of Leiden in The Netherlands. He took early retirement at the end of 2001 from the University of Pretoria, where he was Director of the School of Information Technology, but is still an extraordinary professor in the Department of Informatics. Since 2003 he is also a visiting professor in the Department of Information Systems at the University of Cape Town, and as from 2004, an honorary professor in the Faculty of Business Informatics at the Cape Peninsula University of Technology. At these institutions he continues to work with and supervise PhD students, and conducts his research work mainly in co-operation with his students. He serves on the Editorial Boards of a number of Journals in the field of Information Systems, is chairman of Technical Committee 8 on Information Systems of IFIP, a member of the Steering Committee of the World Information Technology Forum (WITFOR) and was Programme Chair of WITFOR 2005, which was held in Botswana in August 2005.
Keynote Speaker: Dr. Thomas Li, Director of IBM China Research Laboratory

Dr. Thomas Li is the Director of IBM China Research Laboratory. He received his PhD degree in Management Information System from the University of Texas, Austin, USA, in 1991. In addition to his many years of service with IT industry such as IBM, he is very experienced in managing startup companies, manufacturing facilities, as well as consulting practices. He is also very active in both research and higher education. He is an Adjunct Professor at top Chinese research universities such as prestigious Peking University and Tsinghua University where he offers courses "On Demand Transformation Technology". Dr. Li's technical expertise and innovative thinking has led to thirty-nine patents in object technology, digital communication, visualization tools, and database systems. In addition to publications in refereed journals, proceedings, and technical reports, he has been one of the key contributors in delivering eight commercial software products, three hardware systems, and a number of architectural designs and technical specifications.

Speech Title: Continual Business Transformation Technology

The IBM China Research Laboratory (CRL) was established in September 1995 and is one of the eight worldwide IBM Research laboratories. Located in Beijing, CRL has been growing steadily and currently employs over 150 technical staff members. The majority research staffs there hold PhD or master's degrees, and join IBM from leading research universities.

IBM Research's mission is vital to IBM's future success and the IBM China Research Laboratory plays a large role in meeting that goal. CRL continually strives to create world-class information technologies and the underlying science that propels the world's advances. CRL carries out joint research projects with universities and research institutes.
Keynote Speaker: Prof. Dr. Gottfried Vossen, Director of European Research Center for Information Systems

Gottfried Vossen is a Professor of Computer Science in the Department of Information Systems at the University of Muenster in Germany. He received his master's and Ph.D. degrees as well as the German habilitation in 1981, 1986, and 1990, respectively, all from the Technical University of Aachen in Germany. He has held visiting positions at the University of California at San Diego, at several German universities including the Hasso-Plattner-Institute for Software Systems Engineering in Potsdam near Berlin, at Karlstad University in Sweden and at the University of Waikato in Hamilton, New Zealand. In 2004 he became the European Editor-in-Chief of Elsevier's Information Systems An International Journal, and a Director of the European Research Center for Information Systems (ERCIS) in Muenster. He currently also serves as the Vice Dean of the Business School at the University of Muenster. His research interests include conceptual as well as application-oriented problems concerning databases, information systems, electronic learning, and the Web. Dr. Vossen has been a member in numerous program committees of international conferences and workshops. He is an author or co-author of more than 120 publications, and an author, co-author, or co-editor of 20 books on databases, business process modeling, the Web, e-commerce, and computer architecture.

Speech Title: Have Service-Oriented Architectures Taken a Wrong Turn Already?

Information Systems: Information systems are the software and hardware systems that support data-intensive applications. Information Systems publishes articles concerning the design and implementation of languages, data models, algorithms, software and hardware for information systems. Subject areas include data management issues as presented in the principal international database conferences as well as data-related issues from the fields of data mining, information retrieval, natural language processing, internet data management, visual and audio information systems, scientific computing, and organizational behavior. The Editors-in-Chief are Dennis Shasha, New York, and Gottfried Vossen, Muenster.

ERCIS: The ERCIS – European Research Center for Information Systems – is a network of scientists that conduct cooperative research in the field of integrated information systems development and organizational design. For the first time, core competencies in the discipline of information systems are interrelated with issues in the field of computer science, business administration and specific legal issues within an institutional framework. Thus, a holistic view of information system development and organizational design issues can be ensured. Due to its outstanding reputation in both research and teaching within the field of information systems and
business administration, the University of Muenster has been selected by the federal state of North Rhine-Westphalia to establish the European Research Center for Information Systems. Its objective is to undertake joint research projects that span different disciplines and countries, thus fostering research at a level that cannot be achieved by individual go-it-alone projects. The exchange of researchers, such as PhD students, lecturers or (associate) professors, is encouraged and cooperative masters and doctoral programs are also part of the overall objective. http://www.ercis.org
Have Service-Oriented Architectures Taken a Wrong Turn Already?

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Abstract. Service-oriented architectures (SOAs) are the latest industry answer to the quest for functioning software and manageable application landscapes, a quest that has been around for more than 30 years. Although basically a step in the right direction, the fact that SOAs typically proceed "bottom-up," by abstracting step-wise from the basic bit level to higher levels of service coordination and composition, appears questionable. It is argued here that a combined bottom-up/top-down strategy is needed for properly developing SOAs, in which business goals and processes are taken into account right from the beginning. Otherwise, SOAs would have taken a wrong path already.

1 Introduction

Service-oriented architectures (SOAs) are the latest industry answer to the quest for functioning software and manageable application landscapes, a quest and challenge that has been around for more than 30 years. Previous answers have included remote procedure call (RPC), object orientation, the Common Request Broker Architecture (CORBA), and remote method invocation (RMI). A general agreement on what a SOA actually is has not yet been reached, but several features are commonly attributed to a SOA, among them distribution, loose coupling, a directory service, sometime even process-orientation [2]. When it comes to realization, SOAs commonly rely on Web services [1, 4, 8], and here is where the dilemma begins: Although basically a step in the right direction, the fact that SOAs built on Web services proceed strictly "bottom-up," by abstracting step-wise from the basic bit level to higher levels of service coordination and composition, appears questionable. Indeed, Web services typically follow the standards stack shown in Figure 1.
In this stack, a new layer of abstraction is added whenever it is detected that the existing ones are not sufficient anymore. Single messages of the network need SOAP encoding; services should have a description that is written in WSDL; service descriptions need to be published by employing UDDI so that they can indeed be discovered; single services are often not enough, so that several services need to be composed though languages like WSFL, BPEL4WS or, more recently, OWL-S; finally, several services in action need some form of coordination or transactional guarantees. In each case, there is one or more "standard" readily available for describing the intended feature, but it is not clear that this standard will still be around in a year or two, since it may happen that it is either "overruled" by a new standard; furthermore, new features may be identified, most likely again higher in abstraction, that require something else.

What we conclude from this brief consideration is that this is not a good approach. In particular, there is no end of this continued abstraction-building in sight, while at the same time the stack as it now stands is not even mature enough for wide usage (just think of the few UDDI repositories that are actually available today, in spite of the fact that the recognition that adding a "public" directory service to an otherwise RPC-style communication is very desirable is several years old by now). Moreover, studies such as [5] have shown that it is difficult to come up with
conceptual underpinnings or theoretical studies of Web service fundamentals as long as industry seems to be stuck at the details of message exchanges.

It is argued in the remainder of this short paper that a combined bottom-up/top-down strategy, in which business goals and processes are taken into account right from the beginning, is more reasonable for developing SOAs than a pure bottom-up approach. Otherwise, SOAs would have taken a wrong path already and would be doomed to end in an IT nirvana, just like other developments before. We begin by looking at services in general (Section 2), then take a top-down view on SOAs (Section 3) and derive at a conclusion in Section 4.

2 The Service Idea is not new

Service orientation [2, 6, and 7] is a fundamental paradigm of computer science based on the idea that complex functionality can typically be decomposed into a collection of more elementary ones, as indicated in Figure 2.

![Fig. 2: Service-orientation fundamental view](image)

Under this perception, a single service can always be seen as some functionality with specific properties. In a top-down view, the decomposition is important, i.e., the idea that a service as seen from above is typically composed of more fundamental functionality and hence, can be broken down into components. In a bottom-up view, lower-level services are considered to join forces in order to provide more comprehensive functionality to the next higher level.

Web services are perfectly in line with the view just described, which can be found in a number of typical computer science scenarios (e.g., computer hardware, application architectures, computer networks, to name just a few). The important addition that Web services bring along is the fact that they are now linked to a central (and ultimately public) repository, i.e., a "lookup" facility. The repository is a place where a service provider can publish a description of the service(s) he or she is
willing or able to provide, and which service users or clients can query and search for appropriate services. Moreover, providers and clients are no longer tightly, but loosely coupled, since each Web service, which essentially is an individual software component, has a uniform resource identifier (URI) through which it can be placed and located anywhere in the Web.

The provider of a service “builds” the service and simultaneously creates a specification that can be published in a service repository. To this end, established standards (cf. Figure 1) include WSDL, the Web Service Description Language, which provides a format for service specifications. WSDL documents are typically placed in a UDDI (Universal Description, Discovery, and Integration) repository, which clients can search using the respective query language. A search will often look for one or more services in the repository, and, once the search has been successful, the client can directly talk to the provider for a service binding followed by an execution of the chosen service(s). Thereafter, service request and reply calls are exchanged between provider and client in terms of the SOAP (Simple Object Access Protocol) format. This general “setup” is shown in Figure 3; for details, see [1, 6, and 7].

Fig. 3: Basic Web service setup

3 A Top-Down Counter Vision

A typical service-oriented architecture will have to answer the question of which services are available (within, say, a given enterprise) already, which ones need to be newly implemented, and which ones need to be obtained from a suitable provider. To this end, it is reasonable to assume that the enterprise under consideration is aware of its business processes, describing its core competences and its core operations. Thus,
from a top-down development perspective, it makes sense to first come up with one or more process models that together clarify and fix the goals and procedures a client (or a collection of clients in an enterprise) wants to support by appropriately chosen services. Such models will typically be tied to a particular application domain, such as commerce, banking, the travel industry, etc. and will refer to organizational structures and also incorporate objects as well as resources occurring in processes. The next step would be to determine which portions of the overall "process map" can be grouped together in such a way that they can jointly be supported by a service. This step could involve negotiations with potential service providers on the exact amount of service or on the price [3]. The result will then be a SOA which fixes the composition and integration details at a conceptual level and beyond service and departmental borders. In essence, this approach is similar to what has led to area-specific reference models which capture the core processes of an entire branch, and which can be customized to fit the specifics of a particular enterprise. These considerations are summarized in Figure 4.

![Fig. 4. Top-down approach to service-orientation](image-url)
systems, abstracted into enterprise components at the lower end, a portal presentation layer atop a business process choreography at the higher end, and a service layer in the middle, as indicated in Figure 5.

![Layered organization for a SOA](image)

**Fig. 5: Layered organization for a SOA**

### 4 Towards SOAs That Can Work

We believe that SOAs can fly if the business process aspect that is always present is appropriately taken into account. From all that has been learned about business process modeling and reengineering as well as about workflow management and process automation, it has become clear over the last 15 years of research that process views are important, and that a process view of an enterprise is the way of capturing what the enterprise is or should be doing. Thus, it is by no means clear why this should be given up just to make room for a collection of standards that is emerging bottom-up.

On the other hand, it is also clear that a SOA will hardly ever be introduced into an environment where there has been no IT before. In other words, it makes perfectly sense to assume the presence and availability of a number of operational systems that will prevail, and that will still be around even after the SOA has been introduced. So the most reasonable way at the moment seems to be a combination of Figures 2 and 5, which is what we have tried to capture in Figure 6: Enterprise components are masked into individual services, which can be composed in order to yield more comprehensive functionality. The latter, in turn, can be referred to by business process choreography, which is the result of business process modeling, optimization, and reengineering.

True success stories of service-oriented architectures are yet to be seen; nevertheless they represent a promising paradigm for developing future enterprise integration architectures, and it is not too late for driving them in the right direction!
Fig. 6: Extended layered SOA organization

References