# Lecture Notes in Computer Science Edited by G. Goos, J. Hartmanis and J. van Leeuwen

1789

# Springer Berlin

Berlin Heidelberg New York Barcelona Hong Kong London Milan Paris Singapore Tokyo Benkt Wangler Lars Bergman (Eds.)

# Advanced Information Systems Engineering

12th International Conference, CAiSE 2000 Stockholm, Sweden, June 5-9, 2000 Proceedings



### Series Editors

Gerhard Goos, Karlsruhe University, Germany Juris Hartmanis, Cornell University, NY, USA Jan van Leeuwen, Utrecht University, The Netherlands

### Volume Editors

Benkt Wangler University of Skövde Box 408, 541 28 Skövde, Sweden E-mail: benkt@ida.his.se

Lars Bergman Framkom AB Box 1243, 164 28 Kista E-mail: lars@framkom.se

ISBN 3-540-67630-9

Cataloging-in-Publication Data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Advanced information systems engineering: 12th international conference; proceedings / CAiSE 2000, Stockholm, Sweden, June 5 - 9, 2000. Benkt Wangler; Lars Bergmann (ed.). - Berlin; Heidelberg; New York; Barcelona; Hong Kong; London; Milan; Paris; Singapore; Tokyo: Springer, 2000

(Lecture notes in computer science; Vol. 1789)

CR Subject Classification (1998): H.2, H.4-5, J.1, K.4.3, K.6, D.2

ISSN 0302-9743 ISBN 3-540-67630-9 Springer-Verlag Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer-Verlag. Violations are liable for prosecution under the German Copyright Law.

Springer-Verlag is a company in the BertelsmannSpringer publishing group. © Springer-Verlag Berlin Heidelberg 2000 Printed in Germany

Typesetting: Camera-ready by author, data conversion by Steingraeber Satztechnik GmbH, Heidelberg Printed on acid-free paper SPIN: 10720034 06/3142 543210

### **Preface**

CAiSE 2000 was the 12th in the series of International Conferences on Advanced Information Systems Engineering. In the year 2000 the conference returned to Stockholm where it was organized the very first time. Since that year, 1989, the CAiSE conferences have developed into an important forum for the presentation and exchange of research results and practical experiences within the field of Information Systems Engineering. The objective of the CAiSE conference series is to bring together researchers and practitioners in the field of information systems engineering to meet annually in order to discuss evolving research issues and applications in this field. The CAiSE conference series also aims to provide an opportunity for young scientists to establish relationships with senior scientists in their areas of interest.

Stockholm is an important center of research and development for some of the leading IT and communications companies in Europe and indeed, in the world. In tune with this environment, a major theme of CAiSE 2000 was "information systems and services in a digitized world". This theme reflects the vast improvements in communication technology, including the increasing use of Internet and WWW, that has taken place over the last years, and that has led to better communication and easier information access in general. In addition, this development has initiated changes in the way organizations cooperate and trade. Hence, we see the formation of virtual enterprises where smaller companies collaborate to solve tasks they cannot cope with alone. It also leads to improvements in information services to people as consumers and as citizens.

For such information services in a digitized world to become really useful it is necessary that they add value to the workings of businesses and people in their daily lives. This calls for enhancements of methods and tools in order better to understand organizations and the way they interact among themselves and with people. Also, there is a need for enhanced design methods and for services that are truly value adding and that function well together with the organizations' legacy systems. As a consequence, the conference featured paper presentations, panels, and tutorials that addressed these issues from a wide range of perspectives but with a common goal. That goal was to advance the theory and practice of analyzing and designing individual but integrated information services in an organizational context.

Of the 126 papers that were received 32 papers of high academic quality were selected for presentation at the conference. The papers covered topics such as web-based information systems, workflow models and systems, analysis patterns, component-based development, enterprise application integration, data warehousing and many others. In conjunction with the conference, tutorials were given by well-known experts on topics such as component-based development, data mining, business modeling, modeling for ERP systems, and requirements engineering. A special one-day industrial track was organized with experts from industry reporting on the implementation of novel information systems architectures.

The conference was preceded by a large number of scientific workshops covering topics such as modeling methods, requirements engineering, data warehousing, agent-oriented information systems, and business process modeling. A special symposium on information systems engineering was organized in honor of Janis Bubenko Jr., on his retirement.

### VI Preface

CAiSE 2000 was organized jointly by the Department of Computer and Systems Sciences at Stockholm University and KTH, and the Swedish Institute for Systems Development (SISU). We would like to thank all those institutions and individuals who made this conference possible: the Swedish Research Institute for Information Technology (SITI), the University of Skövde, the Electrum Foundation, the sponsors and, of course, all the participants.

March 2000

Benkt Wangler Lars Bergman

# **CAiSE 2000 Conference Organization**

# **Advisory Committee**

### Janis Bubenko Jr.

Kungl. Tekniska Högskolan Stockholm Sweden

Arne Sölvberg
The Norwegian University of Science and Technology, Trondheim Norway

| General Chair  | Programe Chair   | <b>Organizing Chair</b>                                     |
|--|--|---|
| Eva Lindencrona<br>Swedish Institute for<br>Systems Development<br>Stockholm, Sweden | <b>Benkt Wangler</b><br>University of Skövde<br>Sweden | Lars Bergman<br>Swedish IT Institute<br>Stockholm<br>Sweden |
| Tutorials Chair  | Workshop and<br>Poster Chair                           | Organizing<br>Committee                                     |
| Anders G. Nilsson<br>Karlstad University<br>Sweden                                   | Anne Persson<br>University of Skövde<br>Sweden         | Birgitta Olsson<br>Eriks Sneiders<br>Janis Stirna           |

# **Programe Committee**

| Alex Borgida        | USA             | Keith G Jeffery     | United Kingdom |
|---------------------|-----------------|---------------------|----------------|
| Sjaak Brinkkemper   | The Netherlands | Paul Johannesson    | Sweden         |
| Panos Constantopoul | los Greece      | Hannu Kangassalo    | Finland        |
| Jan Dietz           | The Netherlands | Gerti Kappel        | Austria        |
| Marcello Finger     | Brazil          | Karlheinz Kautz     | Denmark        |
| Marcel Franckson    | France          | Pasi Kuvaja         | Finland        |
| Maria Grazia Fugini | Italy           | Michel Léonard      | Switzerland    |
| Janis Grundspenkis  | Latvia          | Frederick Lochovsky | y China        |
| Remigijus Gustas    | Sweden          | Peri Loucopoulos    | United Kingdom |
| Hele-Mai Haav       | Estonia         | Kalle Lyytinen      | Finland        |
| Yannis Ioannidis    | Greece          | Neil Maiden         | United Kingdom |
| Juhani Iivari       | Finland         | Salvatore March     | USA            |
| Matthias Jarke      | Germany         | Peter McBrien       | United Kingdom |

# VIII Organization

| John Mylopoulos    | Canada          | Stefano Spaccapietra | Switzerland     |
|--------------------|-----------------|----------------------|-----------------|
| Moira Norrie       | Switzerland     | Alistair Sutcliffe   | United Kingdom  |
| Antoni Olivé       | Spain           | Bernhard Thalheim    | Germany         |
| Andreas Opdahl     | Norway          | Constantinos Thanos  | Italy           |
| Maria Orlowska     | Australia       | Yannis Vassiliou     | Greece          |
| Michael Papazoglou | The Netherlands | Yair Wand            | Canada          |
| Barbara Pernici    | Italy           | Benkt Wangler (chair | ) Sweden        |
| Naveen Prakash     | India           | Tony Wasserman       | USA             |
| Colette Rolland    | France          | Roel Wieringa        | The Netherlands |
| Matti Rossi        | The Netherlands | Jian Yang            | Australia       |
| Michael Schrefl    | Australia       | Naoki Yonezaki       | Japan           |
| Timos Sellis       | Greece          | Eric Yu              | Canada          |
| Amilcar Sernadas   | Portugal        | Roberto Zicari       | Germany         |
| Keng Siau          | USA             |                      | •               |

# **Additional Referees**

| Giuseppe Amato      | Italy           | S.J. Paheerathan    | Sri Lanka       |
|---------------------|-----------------|---------------------|-----------------|
| Per Backlund        | Sweden          | Anne Persson        | Sweden          |
| Joseph Barjis       | The Netherlands | Guenter Preuner     | Australia       |
| Alistair Barros     | Australia       | Claus Priese        | Germany         |
| Danny Brash         | Sweden          | Jaime Ramos         | Portugal        |
| Janis Bubenko Jr.   | Sweden          | João Rasga          | Portugal        |
| Carlos Caleiro      | Portugal        | Wasim Sadiq         | Australia       |
| Fabio Casati        | Italy           | Shazia Sadiq        | Australia       |
| Donatella Castelli  | Italy           | Han Schouten        | The Netherlands |
| Rik Eshuis          | The Netherlands | Klaas Sikkel        | The Netherlands |
| L. Feng             | The Netherlands | Cristina Sernadas   | Portugal        |
| Paula Gouveia       | Portugal        | Eriks Sneiders      | Latvia          |
| Shigegi Hagihara    | Japan           | Yannis Stavrakas    | Greece          |
| Wilhelm Hasselbring | The Netherlands | Janis Stirna        | Latvia          |
| Bart-Jan Hommes     | The Netherlands | Mattias Strand      | Sweden          |
| Marius Janson       | USA             | Masato Suzuki       | Japan           |
| Prasad Jayaweera    | Sri Lanka       | Eva Söderström      | Sweden          |
| Ingi Jonasson       | Iceland         | Arne Sölvberg       | Norway          |
| Mira K-Matsson      | Sweden          | T. Thalhammer       | Australia       |
| Steven Kelly        | Finland         | Dimitri Theodoratos | Greece          |
| Sven-Eric Lautemann | n Germany       | Juha-Pekka Tolvanen | Finland         |
| Jianguo Lu          | Canada          | Panos Vassiliadis   | Greece          |
| Paul Mallens        | The Netherlands | Hans Weigand        | The Netherlands |
| Olivera Marjanovic  | Australia       | Peter Werner        | Germany         |
| Kenji Masui         | Japan           | Maria A. Wimmer     | Austria         |
| Paulo Mateus        | Portugal        | Kenji Yamashita     | Japan           |
| Yoshiaki Minamisaw  | a Japan         | Noriaki Yoshiura    | Japan           |
| Werner Obermair     | Australia       |                     | -               |

# **Table of Contents**

| Keynote Speech   |   |
|--|---|
| BIO/COM*: Mixing Water with Fire  Dennis Tsichritzis   | 1 |
| Panel  |   |
| Why Is It So Difficult to Introduce RE <sup>1</sup> Research Results into Mainstream RE Practice?                  | 7 |
| Web-Based Information Systems and Services   |   |
| Adaptive and Dynamic Service Composition in <i>eFlow</i>   | 3 |
| Towards Extensible Information Brokers Based on XML  | 2 |
| Advertising Database Capabilities for Information Sharing  | 7 |
| A Personal Assistant for Web Database Caching64 Beat Signer, Antonia Erni, Moira C. Norrie                         |   |
| Extending a Conceptual Modelling Approach to Web Application Design79  Jaime Gómez, Cristina Cachero, Oscar Pastor | 9 |
| Efficient Distributed Workflow Management Based on Variable Server Assignments9.  Thomas Bauer, Peter Dadam        | 4 |

<sup>\*</sup> BIO stands for Biology, Biochemistry, Biotechnology, etc. COM stands for Computer, Communication, Computability, Complexity, etc.

<sup>&</sup>lt;sup>1</sup> Requirements Engineering

# **Workflow Models and Systems**

| A Logical Framework for Exception Handling in ADOME Workflow Management System110 Dickson Chiu, Qing Li, Kamalakar Karlapalem   |
|---|
| Controlled Flexibility in Workflow Management   |
| A Formal Model for Business Process Modeling and Design   |
| Patterns and Components   |
| Conceptual Patterns for Reuse in Information Systems Analysis   |
| Evaluating a Pattern Approach as an Aid for the Development of Organisational Knowledge: An Empirical Study   |
| Specifying Processes with Dynamic Life Cycles192  Rick van Rein   |
| Enterprise Application Integration  |
| Design Principles for Application Integration   |
| CHAOS: An Active Security Mediation System232  David Liu, Kincho Law, Gio Wiederhold  |
| Modeling and Composing Service-Based and Reference Process-Based Multi-enterprise Processes247  Hans Schuster, Dimitrios Georgakopoulos, Andrzej Cichocki, Donald Baker |
| The Information Systems Development Process   |
| Gossip: An Awareness Engine for Increasing Product Awareness in Distributed Development Projects  |

| How Culture Might Impact on the Implementation of Enterprise Resource Planning Packages                           |
|---|
| Capture and Dissemination of Experience about the Construction of Engineering Processes                           |
| Reuse in Information Systems Engineering  |
| Practical Reuse Measurement in ERP Requirements Engineering309  Maya Daneva                                       |
| Building Extensible Workflow Systems Using an Event-Based Infrastructure325<br>Dimitrios Tombros, Andreas Geppert |
| Defining Components in a MetaCASE Environment340  Zheying Zhang   |
| Information Systems Reengineering   |
| Tracing All Around  |
| A Framework for the Evolution of Temporal Conceptual Schemas of Information Systems                               |
| Distance Measures for Information System Reengineering  |
| Modeling Languages  |
| StateLator - Behavioral Code Generation as an Instance of a Model Transformation                                  |
| An Overview of RoZ: A Tool for Integrating UML and Z Specifications   |
| On Structured Workflow Modelling  |

## XII Table of Contents

# **Databases and Data Warehousing**

| Author Index   |
|--|
| The Impacts of Electronic Commerce in the Automobile Industry:  An Empirical Study in Western Australia    |
| Managing the Software Process in the Middle of Rapid Growth:  A Metrics Based Experiment Report from Nokia |
| Investigations into Industrial Processes   |
| Modelling and Optimisation Issues for Multidimensional Databases   |
| Temporally Faithful Execution of Business Transactions   |
| A Model for Data Warehouse Operational Processes   |