



# The 6th World Multiconference on Systemics, Cybernetics and Informatics

July 14-18, 2002  
Orlando, Florida, USA

## PROCEEDINGS

Volume I

Information Systems Development I

Organized by IIIS



International  
Institute of  
Informatics and  
Systemics

Member of the  
International Federation of  
Systems Research IFSR

EDITED BY  
Nagib Callaos  
Luis Hernandez-Encinas  
Fahri Yetim

UB/TIB Hannover  
124 986 79X

89



# CONTENTS

## VOLUME I

### Information Systems Development I

#### Contents

i

#### Information Systems, Development Methods and Methodologies

Alvarez, Sofia (Cuba): "Method for the improvement of the processes of software of the entity software producer"	1
Angeli, C.; Chatzinikolaou, A. (Greece): "A Validation Approach for an on-line Diagnostic Expert System"	5
Angeli, C.; Chatzinikolaou, A. (Greece): "Data Handling for Real-time Fault Diagnosis in Hydraulic Drive Systems with Proportional Control"	11
Böhlen, Boris; Jäger, Dirk; Schleicher, Ansgar; Westfechtel, Bernhard (Germany): "UPGRADE: Building Interactive Tools for Visual Languages"	17
Botting, Richard J. (USA): "Some Stochastic Models of Software Evolution"	23
Butler, Samantha J.; Hope, Sian (UK): "Software Process Evaluation for Improvement Using Remote Monitoring Methods"	28
Cai, Zixing; Gong, Tao (China): "Multi-Dimension Education Immune Network"	32
Campos dos Santos, J. L. *; De By, R. A. *; Apers, P. M.G. *; Magalhães, C. ** (* The Netherlands, ** Brazil): "Clustered Object Schemas for INPA's Biological Collections Data"	38
Clempner, Julio; Gutiérrez, Agustín (Mexico): "ITSP: A Methodology for IS Prioritization Using Bireticular Structures"	45
Chang, Jae-Woo; Kim, Young-Chang (Korea-(Republic-of)): "A Cell-based High-dimensional Indexing Scheme for Similarity Search in Multimedia Databases"	51
Chiou, Yin-Wah (Taiwan): "Integrating and Processing XML Documents with JavaBeans Components"	57
De Diego, José R.; Tuya, Javier; De la Riva, Claudio (Spain): "Software Process to specify and verify Reactive Systems. Process and Context generation"	63
Formica, Anna; Missikoff, Michele (Italy): "An Extended XML Approach to Ontology Engineering"	69

Fuentes, José M.; Pérez, Almiro; Lloréns, Juan; De Amescua, Antonio (Spain): "UQS: UML Query By Example System based on XMI"	72
Fujita, Naoyuki (Japan): "A Detection Design for Distributed Denial of Service Attack"	78
Hu, Jian *; Shima, Kazuyuki *; Ruediger, Oehlmann **; Zhao, Jiamin ***; Takemura, Yasuhiro *; Matsumoto Ken-ichi * (* Japan, **UK, *** China): "An Investigation of Impressions of B2C Web Pages in China, Japan, and the UK"	83
Hu, Wen-Chen *; Yeh, Jyh-Haw *; Lin, Wei-Chuan **; (* USA, ** Taiwan): "An XML World Wide Web Search Engine Using Finite Automata"	89
Khoury, Carole (France): "OO-AS-IS, an Object Oriented Algebraic Specification formalism with Implicit State for reactive systems"	95
Kobayashi, Satomi; Nakanishi, Tsuneo; Fukuda, Akira (Japan): "Power Aware Memory Management for Embedded Systems"	101
Korhonen, Kalle (Finland): "Empirical Study on an Experimental DSL for Product-Line Development"	107
Lo, Sau-Han; Meng, Helen Mei-Ling; Lam, Wai (Hong-Kong): "Automatic Bilingual Text Document Summarization"	113
Man, Kwai-Hing; Sathaye, Archana (USA): "Web-Based Bill-Payment System"	119
Németh, Gábor (Hungary): "A Generic Model of Information Processing Systems"	125
Ortega, Dinarle; Soriano, Amelia (Venezuela): "UP and Incremental Approach in the Definition of a Project of Investigation"	130
Patel, S.; Patel, D.; Carter, G. (UK): "Strategy for Understanding Business Problems and Developing an Integrated Solution"	134
Pröll, Birgit (Austria): "Exploring Hypermedia Design Patterns in Web-based Tourism Information Systems"	140
Rufai, Raimi; Ahmed, Moataz; Alghamdi, Jarallah (Saudi-Arabia): "Towards a Unified Software Component Representation"	146
Sendelj, Ramo A.; Devedzic, Vladan (Yugoslavia): "Fuzzy Systems Based on Component Software"	151
Sveda, Miroslav; Vrba, Radimir (Czech-Republic): "Embedded System Formal Specifications Reuse by a Case-Based Reasoning Approach"	157
Tsuji, Hiroshi; Terada, Masato; Mori, Yasuharu (Japan): "e-Transformation: Building e-Service Systems"	163
Wang, Li-hong; Wu, Geng-feng (China): "Attribute Reduction and Information Granularity"	168

Zheng, Fei (China): "A Reduction Method of Attribute Values Based on the Calculus of Rough Logic Formulas"	173
--	-----

## **Systemic and Systematic Methodologies and Meta-Methodologies**

Fujii, Akihiro; Okada, Roberto; Ohtani, Tuyoshi (Japan): "Business Rule Construction by Software Agent"	178
Hidaka, Soichiro; Kodama, Kazuya; Ji, Yusheng; Maruyama, Katsumi (Japan): "A File Server Optimization Using Scatter/Gather IPC on L4 Based Multi-Server Operating System"	184
Khalid Hamza, Mohammad; Pandya, Abhi (USA): "Toward a Theory of Assessing Human Learning: A Complex-Thinking Model"	190
Lorents, Peeter (Estonia): "A System Mining Framework"	195
Lu, Chunlian (China): "Special Statistical Data Warehouse __ A new integration system of OLTP and OLAP for SCI 2002"	201
Mazumdar, Subhasish (USA): "Tackling the Software Crisis via Conceptual Modeling"	205
Sabas, Arsène; Badri, Mourad; Delisle, Sylvain (Canada): "A Multidimensional Framework for the Evaluation of Multiagent System Methodologies"	211

## **Special Methodologies for Specific Kinds of Applications (DSS, EIS, etc.)**

Khiat, Assia (France): "Higher Education and New Technologies: Continuing Education for Engineers"	217
Lertdumrongluck, Nuntiya; Temtanapat, Yaowadee (Thailand): "Ingredient Mining for Food Recipe Production"	221
Milićević, Dragan B.; Milenković, Slobodan S.; Nikolić, Veljko V. (Yugoslavia): "The Informatics Support To The Water Resources Integral Protection From Pollution"	227
Mooshage, Oliver; Distelmaier, Helmut (Germany): "A methodology to build a knowledge-based support system for tactical decision making"	233
Nouza, Tomás; Nouza, Jan; Drábková, Jindra (Czech-Republic): "An Efficient Graphic System for Developing Voice Operated Applications"	239
Somodevilla, Maria; Petry, Frederick E.; Foley, Harold (USA): "Multi-Criteria Based Approach To Perform Maps' Integration In GIS"	245
Stegg, Martin (Germany): "Air Traffic Control- Safety, Performance, Software Engineering, System Management"	251

Swamynathan, S.; Geetha, T. V. (India): "Design of Rule System for Reasoning in a Distributed Business Logic"	257
Vat, Kam Hou (Macau): "Engineering Component-Based Knowledge Applications for e-Learning Organizations: The Software Architects' Challenge in Organizational Transformation"	262

## **User Interface Design**

Aleksy, Markus; Schader, Martin (Germany): "Design Alternatives in the Definition of IDL Interfaces"	268
Benecke, Klaus (Germany): "Stroke - A Powerful Operation for XML-like Data"	273
Effken, Judith A.; Loeb, Robert G.; Johnson, Karen L.; Johnson, Stephen B.; Reyna, Valerie F. (USA): "Preliminary Evaluation of an Oxygenation Management Display"	279
Le Peutrec, Stéphane; Courant, Michèle (Switzerland): "Dynamic Interfaces for Autonomous Applications"	285
Nakatani, Yoshio (Japan): "National Land Administration by Advanced CCTV System"	289
Riley, John Thomas (USA): "A New Model for the Human in the Human-Computer Interface"	294
Stempfhuber, Maximilian; Hellweg, Heiko; Schaefer, André (Germany): "ELVIRA: User Friendly Retrieval of Heterogeneous Data in Market Research"	299

## **Requirements Engineering and Specifications Gathering**

Bollen, Peter (The Netherlands): "Using Object-Role Modeling for capturing user requirements expressed as UML class diagrams"	305
Della Penna, Giuseppe; Intrigila, Benedetto; Laurenzi, Anna Rita; Orefice, Sergio (Italy): "An XML Definition Language for Software System Specification"	311
He, Yanxiang *; Feng, Xiagen *; Song, Qiang *; Jing, He ** (* China, ** USA): "Max Unification Based On Sort Algorithm to Resolve Temporal Conflicts in Multiple Viewpoints Requirements Engineering in Z"	316
Polovina, Rubin *; Wojtkowski, Wita ** (* Canada, ** USA): "Reusable Abstract Design as a Knowledge Repository: Its Utility in Software Intense Systems for the Networked Enterprise"	321

## **Software Engineering**

- Al-Elaiwi, Abdulhameed A.; Whittaker, James A.; Shaikh, Muzaffar A. (USA): "Overcoming Limitations of Software Cost Estimation (SCE) Models: an Innovative SCE Model" 327
- Barber, K. S.; Holt, J. (USA): "Supporting Separation of Concerns During Software Architecture Performance Evaluation" 333
- Cuadrado, Juan J.; Amescua, Antonio; García, Luis; Marbán, Oscar; Sánchez, María I. (Spain): "Revision and Classification of Current Software Cost Estimation Models" 339
- Font, John R.; Ortiz, Lourdes M. (Venezuela): "MESEM: Security Mechanism for Multimedia Products" 342
- Losavio, Francisca (Venezuela): "Standard Quality Model to Design Software Architecture" 347
- Maeda, Kazuaki (Japan): "XML Based Object Serialization with Multiple Language Support" 353
- Masurkar, Vijay B. (USA): "ASP Deployment Architecture & Security" 359

## **Testing and Quality Assurance, Total Quality in Information Systems Analysis and Synthesis**

- Bailey, James R.; Stroud, Charles E. (USA): "Embedded Logic Analyzers For On-Line System Analysis" 365
- Ortega, Maryoly; Pérez, María A.; Rojas, Teresita (Venezuela): "A Systemic Quality Model for Evaluating Software Products" 371
- Pai, Wen C.; Wu, Ching-Ang (Taiwan): "A Program Recognition and Auto-Testing Approach" 377
- Zhou, Shirley; Sathaye, Archana; Chen, Bill (USA): "WebQARS: Web-Based Quality And Reliability System" 383

## **Cultural Aspects of Information Systems – Invited Session Organizer: Fahri Yetim (USA)**

- Anderson, William N. (USA): "Culturally Heterogeneous vs. Culturally Homogeneous Groups in Distributed Group Support Systems: Effects on Satisfaction" 389
- Iivari, Netta (Finland): "Analyzing the Role of Organizational Culture in the Implementation of User-Centered Design - Disentangling the Culture Construct" 396
- Kamentz, Elisabeth; Womser-Hacker, Christa (Germany): "Cross-Cultural" 402

Differences in Academic Styles and Learning Behavior in the Context of the Design of Adaptive Educational Hypermedia"	
Raybourn, Elaine M. *; Davies, John **; Kings, Nicholas J.** (* USA, ** UK): "Future Directions in Supporting Virtual Communities of Practice: Designing Tacit Culture in Adaptive Collaborative Knowledge Sharing Environments"	408
Vrazalic, Lejla (Australia): "Designing for Diversity: Towards an Activity Theory based Methodology"	414
Yetim, Fahri (USA): "Towards A Knowledge Repository for Supporting Structured Communication in Local and Global Communities"	420

**Commodity, High-Performance Cluster Computing Technologies and Applications – Invited Session**  
**Organizer: Tau Leng (USA)**

Baresi, Luciano; Garzotto, Franca; Maritati, Monica (Italy): "W2000 as a MOF Metamodel"	425
Finkelstein, Anthony C. W. *; Savigni, Andrea *; Kappel, Gerti **; Retschitzegger, Werner **; Kimmerstorfer, Eugen **; Schwinger, Wieland **; Hofer, Thomas **; Pröll, Birgit **; Feichtner, Christian ** (* UK, ** Austria): "Ubiquitous Web Application Development-A Framework for Understanding"	431
Stolle, René; Rossak, Wilhelm (Germany): "ilib – GUI Components in Web Programming"	439
Wang, Yuanzhen; Zhang, Zhibing; Li, Huayang (China): "Web-Based Commerce with Agents"	445
Weippl, Edgar *; Ibrahim, Ismail Khalil ** (* Austria, ** The Netherlands): "Using the Web for Distributed Development of E-Learning Content"	450

**Mathematical Methods in Cryptography and Cryptanalysis – Invited Session**  
**Organizer: Luis Hernandez-Encinas (Spain)**

Caballero-Gil, Pino; Hernández-Goya, Candelaria (Spain): "How to Construct Cryptographic Protocols from Graph Theory"	456
Durán Díaz, Raúl; Peinado Domínguez, Alberto (Spain): "BBS generator using the function $x^2 - 2 \pmod n$ "	462
Füster-Sabater, Amparo; De la Guía-Martínez, Dolores; Caballero-Gil, Pino (Spain): "Analysis of Structural Properties of Shrinking Generators as a Subset of Cellular Automata"	466
Hernández-Encinas, Luis; Martín del Rey, Angel; Hernández Encinas, Ascensión (Spain): "Encryption of Images with 2-dimensional Cellular	471

Automata"

Hernández-Encinas, Luis; Muñoz-Masqué, Jaime (Spain): "Classification of Genus-2 Hyperelliptic Curves over  $F_3^m$ " 477

Salazar, José L. (Spain): "Isomorphic elliptic curves for cryptographic use" 483

**Toward New Software Development, Methodologies And Techniques  
Invited Session**

**Organizer: Hamido Fujita (Japan)**

Atsumi, Osamu (Japan): "A New Algorithm-Free Open Key Encryption System For Digital Signature with e-Arbitration, Particulary Suited for e-Commerce, e-Banking and Other High Security Applications" 488

Di Sciullo, Anna Maria (Canada): "Asymmetry-Based Morphological Analysers Using Natural Language Asymmetries In Information Processing" 494

Nakamura, Yoshinori; Fujita, Hamid (Issam) (Japan): "Research on Intelligent Intrusion Detection Systems" 500

Poli, Roberto (Italy): "Automatic Generation of Programs: An Overview of Lyee Methodology" 506

Tomura, Shigeaki; Fujita, Hamido (Japan): "A Framework of Software Methodology Based on Word Structure" 512