

Dimitris Karagiannis
Ulrich Reimer (Eds.)

LNAI 3336

Practical Aspects of Knowledge Management

5th International Conference, PAKM 2004
Vienna, Austria, December 2004
Proceedings



Springer

TP182-53

P152
2006

Dimitris Karagiannis Ulrich Reimer (Eds.)

Practical Aspects of Knowledge Management

5th International Conference, PAKM 2004
Vienna, Austria, December 2-3, 2004
Proceedings



E200500355



Springer

Series Editors

Jaime G. Carbonell, Carnegie Mellon University, Pittsburgh, PA, USA
Jörg Siekmann, University of Saarland, Saarbrücken, Germany

Volume Editors

Dimitris Karagiannis
University of Vienna
Faculty of Computer Science, Department of Knowledge Engineering
Brünner Strasse 72, 1210 Vienna, Austria
E-mail: dk@dke.univie.ac.at

Ulrich Reimer
Business Operation Systems
Esslenstr. 3, 8280 Kreuzlingen, Switzerland
E-mail: ulrich.reimer@bauer-partner.com

Library of Congress Control Number: 2004116218

CR Subject Classification (1998): I.2, H.2.8, H.3, H.4, H.5, K.4, J.1

ISSN 0302-9743

ISBN 3-540-24088-8 Springer 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. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media

springeronline.com

© Springer-Verlag Berlin Heidelberg 2004
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Olgun Computergrafik
Printed on acid-free paper SPIN: 11362227 06/3142 5 4 3 2 1 0

Lecture Notes in Artificial Intelligence

3336

Edited by J. G. Carbonell and J. Siekmann

Subseries of Lecture Notes in Computer Science

Preface

This book contains the papers presented at the 5th International Conference on Practical Aspects of Knowledge Management organized by the Department of Knowledge Management, Institute of Computer Science and Business Informatics, University of Vienna. The event took place on December 02–03, 2004 in Vienna.

The PAKM conference series offers a communication forum and meeting ground for practitioners and researchers engaged in developing and deploying advanced business solutions for the management of knowledge and intellectual capital. Contributions pursuing integrated approaches which consider organizational, technological and cultural issues of knowledge management have been elected for presentation. PAKM is a forum for people to share their views, to exchange ideas, to develop new insights, and to envision completely new kinds of solutions for knowledge management problems.

The accepted papers are of high quality and are not too specialized so that the main issues can be understood by someone outside the respective field. This is crucial for an interdisciplinary exchange of ideas. Like its predecessors, PAKM 2004 featured two invited talks.

It is a real joy seeing the visibility of the conference increase and noting that knowledge management researchers and practitioners from all over the world submitted papers. This year, 163 papers and case studies were submitted, from which 48 were accepted.

Many people were involved in setting up PAKM 2004. We would like to express our warm thanks to everybody who contributed to making it a success. First of all, this includes all the authors who submitted a paper to the review process, and the members of the program committee who made all the efforts to select the best papers and to ensure a high-quality program. Special thanks go to Prof. Dr. Hermann Krallmann and Prof. Dr. Dimitris Plexousakis for giving the keynote talks.

Most of the organizational work was done by Michaela Schein, reliable and industrious as always. She also managed the local organization. Our thanks also include the session chairs for their support in running a smooth conference, and all the participants who made the event possible in the first place.

Our wish is that all participants found it worthwhile to attend PAKM 2004 and returned home with many new ideas and valuable contacts.

Vienna, December 2, 2004

Dimitris Karagiannis
Ulrich Reimer

Organization

Co-chairs

Dimitris Karagiannis, University of Vienna, Austria

Ulrich Reimer, Business Operation Systems, Switzerland

Program Committee

Xavier Boucher, École des Mines de St. Etienne, France

Kemal A. Delic, Hewlett-Packard, France

Juan Manuel Doderio, University Carlos III, Madrid, Spain

Joaquim Filipe, Escola Superior de Tecnologia Setubal, Portugal

Naoki Fukuta, Shizuoka University, Japan

Norbert Gronau, University of Oldenburg, Germany

Ulrich Geske, Fraunhofer Gesellschaft FIRST, Germany

Knut Hinkelmann, FH Solothurn Nordwestschweiz, Switzerland

Hans Hinterhuber, University of Innsbruck, Austria

Achim Hoffmann, University of New South Wales, Australia

Manfred Jeusfeld, University of Tilburg, Netherlands

Byeong Ho Kang, University of Tasmania, Tasmania

Niklaus Klaentschi, Swiss KM Forum, Switzerland

Edith Denman-Maier, Donau University, Krems, Austria

Vladimir Marik, Czech Technical University, Czech Republic

Frank Maurer, University of Calgary, Canada

Hermann Maurer, Technical University of Graz, Austria

Heinrich Mayr, University of Klagenfurt, Austria

Michele Missikoff, Italian National Research Council, Italy

Katharina Morik, University of Dortmund, Germany

Nikolaos A. Mylonopoulos, ALBA, Greece

Peter Reimann, University of Sydney, Australia

Debbie Richards, Macquarie University, Australia

Bodo Rieger, University of Osnabrueck, Germany

Isabel Seruca, Universidade Portucalense, Portugal

Marcin Sikorski, Gdansk University of Technology, Poland

Marcus Spies, Munich University, Germany

Steffen Staab, University of Karlsruhe, Germany

Rudi Studer, University of Karlsruhe, Germany

Ulrich Thiel, Fraunhofer Gesellschaft, Germany

A Min Tjoa, Technical University of Vienna, Austria

Klaus Tochtermann, I-Know Center, Graz, Austria

Robert Trappl, Medical University of Vienna, Austria

Erich Tsui, Computer Sciences Corporation, Australia

Roland Wagner, Johannes Kepler University, Linz, Austria

Fritjof Weber, University of Bremen, Germany

Rosina Weber, Drexel University, USA

Takahira Yamaguchi, Keio University, Japan

Lecture Notes in Artificial Intelligence (LNAI)

- Vol. 3339: G.I. Webb, X. Yu (Eds.), *AI 2004: Advances in Artificial Intelligence*. XXII, 1272 pages. 2004.
- Vol. 3336: D. Karagiannis, U. Reimer (Eds.), *Practical Aspects of Knowledge Management*. X, 524 pages. 2004.
- Vol. 3315: C. Lemaître, C.A. Reyes, J.A. González (Eds.), *Advances in Artificial Intelligence – IBERAMIA 2004*. XX, 987 pages. 2004.
- Vol. 3303: J.A. López, E. Benfenati, W. Dubitzky (Eds.), *Knowledge Exploration in Life Science Informatics*. X, 249 pages. 2004.
- Vol. 3275: P. Perner (Ed.), *Advances in Data Mining*. VIII, 173 pages. 2004.
- Vol. 3265: R.E. Frederking, K.B. Taylor (Eds.), *Machine Translation: From Real Users to Research*. XI, 392 pages. 2004.
- Vol. 3264: G. Paliouras, Y. Sakakibara (Eds.), *Grammatical Inference: Algorithms and Applications*. XI, 291 pages. 2004.
- Vol. 3259: J. Dix, J. Leite (Eds.), *Computational Logic in Multi-Agent Systems*. XII, 251 pages. 2004.
- Vol. 3257: E. Motta, N.R. Shadbolt, A. Stutt, N. Gibbins (Eds.), *Engineering Knowledge in the Age of the Semantic Web*. XVII, 517 pages. 2004.
- Vol. 3249: B. Buchberger, J.A. Campbell (Eds.), *Artificial Intelligence and Symbolic Computation*. X, 285 pages. 2004.
- Vol. 3245: E. Suzuki, S. Arikawa (Eds.), *Discovery Science*. XIV, 430 pages. 2004.
- Vol. 3244: S. Ben-David, J. Case, A. Maruoka (Eds.), *Algorithmic Learning Theory*. XIV, 505 pages. 2004.
- Vol. 3238: S. Biundo, T. Frühwirth, G. Palm (Eds.), *KI 2004: Advances in Artificial Intelligence*. XI, 467 pages. 2004.
- Vol. 3230: J.L. Vicedo, P. Martínez-Barco, R. Muñoz, M. Saiz Noeda (Eds.), *Advances in Natural Language Processing*. XII, 488 pages. 2004.
- Vol. 3229: J.J. Alferes, J. Leite (Eds.), *Logics in Artificial Intelligence*. XIV, 744 pages. 2004.
- Vol. 3215: M.G. Negoita, R.J. Howlett, L.C. Jain (Eds.), *Knowledge-Based Intelligent Information and Engineering Systems, Part III*. LVII, 906 pages. 2004.
- Vol. 3214: M.G. Negoita, R.J. Howlett, L.C. Jain (Eds.), *Knowledge-Based Intelligent Information and Engineering Systems, Part II*. LVIII, 1302 pages. 2004.
- Vol. 3213: M.G. Negoita, R.J. Howlett, L.C. Jain (Eds.), *Knowledge-Based Intelligent Information and Engineering Systems, Part I*. LVIII, 1280 pages. 2004.
- Vol. 3209: B. Berendt, A. Hotho, D. Mladenic, M. van Someren, M. Spiliopoulou, G. Stumme (Eds.), *Web Mining: From Web to Semantic Web*. IX, 201 pages. 2004.
- Vol. 3206: P. Sojka, I. Kopecek, K. Pala (Eds.), *Text, Speech and Dialogue*. XIII, 667 pages. 2004.
- Vol. 3202: J.-F. Boulicaut, F. Esposito, F. Giannotti, D. Pedreschi (Eds.), *Knowledge Discovery in Databases: PKDD 2004*. XIX, 560 pages. 2004.
- Vol. 3201: J.-F. Boulicaut, F. Esposito, F. Giannotti, D. Pedreschi (Eds.), *Machine Learning: ECML 2004*. XVIII, 580 pages. 2004.
- Vol. 3194: R. Camacho, R. King, A. Srinivasan (Eds.), *Inductive Logic Programming*. XI, 361 pages. 2004.
- Vol. 3192: C. Bussler, D. Fensel (Eds.), *Artificial Intelligence: Methodology, Systems, and Applications*. XIII, 522 pages. 2004.
- Vol. 3191: M. Klusch, S. Ossowski, V. Kashyap, R. Unland (Eds.), *Cooperative Information Agents VIII*. XI, 303 pages. 2004.
- Vol. 3187: G. Lindemann, J. Denzinger, I.J. Timm, R. Unland (Eds.), *Multiagent System Technologies*. XIII, 341 pages. 2004.
- Vol. 3176: O. Bousquet, U. von Luxburg, G. Rätsch (Eds.), *Advanced Lectures on Machine Learning*. IX, 241 pages. 2004.
- Vol. 3171: A.L.C. Bazzan, S. Labidi (Eds.), *Advances in Artificial Intelligence – SBIA 2004*. XVII, 548 pages. 2004.
- Vol. 3159: U. Visser, *Intelligent Information Integration for the Semantic Web*. XIV, 150 pages. 2004.
- Vol. 3157: C. Zhang, H. W. Guesgen, W.K. Yeap (Eds.), *PRICA 2004: Trends in Artificial Intelligence*. XX, 1023 pages. 2004.
- Vol. 3155: P. Funk, P.A. González Calero (Eds.), *Advances in Case-Based Reasoning*. XIII, 822 pages. 2004.
- Vol. 3139: F. Iida, R. Pfeifer, L. Steels, Y. Kuniyoshi (Eds.), *Embodied Artificial Intelligence*. IX, 331 pages. 2004.
- Vol. 3131: V. Torra, Y. Narukawa (Eds.), *Modeling Decisions for Artificial Intelligence*. XI, 327 pages. 2004.
- Vol. 3127: K.E. Wolff, H.D. Pfeiffer, H.S. Delugach (Eds.), *Conceptual Structures at Work*. XI, 403 pages. 2004.
- Vol. 3123: A. Belz, R. Evans, P. Piwek (Eds.), *Natural Language Generation*. X, 219 pages. 2004.
- Vol. 3120: J. Shawe-Taylor, Y. Singer (Eds.), *Learning Theory*. X, 648 pages. 2004.
- Vol. 3097: D. Basin, M. Rusinowitch (Eds.), *Automated Reasoning*. XII, 493 pages. 2004.
- Vol. 3071: A. Omicini, P. Petta, J. Pitt (Eds.), *Engineering Societies in the Agents World*. XIII, 409 pages. 2004.
- Vol. 3070: L. Rutkowski, J. Siekmann, R. Tadeusiewicz, L.A. Zadeh (Eds.), *Artificial Intelligence and Soft Computing – ICAISC 2004*. XXV, 1208 pages. 2004.

- Vol. 3068: E. André, L. Dybkjær, W. Minker, P. Heisterkamp (Eds.), *Affective Dialogue Systems*. XII, 324 pages. 2004.
- Vol. 3067: M. Dastani, J. Dix, A. El Fallah-Seghrouchni (Eds.), *Programming Multi-Agent Systems*. X, 221 pages. 2004.
- Vol. 3066: S. Tsumoto, R. Słowiński, J. Komorowski, J.W. Grzymala-Busse (Eds.), *Rough Sets and Current Trends in Computing*. XX, 853 pages. 2004.
- Vol. 3065: A. Lomuscio, D. Nute (Eds.), *Deontic Logic in Computer Science*. X, 275 pages. 2004.
- Vol. 3060: A.Y. Tawfik, S.D. Goodwin (Eds.), *Advances in Artificial Intelligence*. XIII, 582 pages. 2004.
- Vol. 3056: H. Dai, R. Srikant, C. Zhang (Eds.), *Advances in Knowledge Discovery and Data Mining*. XIX, 713 pages. 2004.
- Vol. 3055: H. Christiansen, M.-S. Hacid, T. Andreassen, H.L. Larsen (Eds.), *Flexible Query Answering Systems*. X, 500 pages. 2004.
- Vol. 3048: P. Faratin, D.C. Parkes, J.A. Rodríguez-Aguilar, W.E. Walsh (Eds.), *Agent-Mediated Electronic Commerce V*. XI, 155 pages. 2004.
- Vol. 3040: R. Conejo, M. Urretavizcaya, J.-L. Pérez-de-la-Cruz (Eds.), *Current Topics in Artificial Intelligence*. XIV, 689 pages. 2004.
- Vol. 3035: M.A. Wimmer (Ed.), *Knowledge Management in Electronic Government*. XII, 326 pages. 2004.
- Vol. 3034: J. Favela, E. Menasalvas, E. Chávez (Eds.), *Advances in Web Intelligence*. XIII, 227 pages. 2004.
- Vol. 3030: P. Giorgini, B. Henderson-Sellers, M. Winikoff (Eds.), *Agent-Oriented Information Systems*. XIV, 207 pages. 2004.
- Vol. 3029: B. Orchard, C. Yang, M. Ali (Eds.), *Innovations in Applied Artificial Intelligence*. XXI, 1272 pages. 2004.
- Vol. 3025: G.A. Vouros, T. Panayiotopoulos (Eds.), *Methods and Applications of Artificial Intelligence*. XV, 546 pages. 2004.
- Vol. 3020: D. Polani, B. Browning, A. Bonarini, K. Yoshida (Eds.), *RoboCup 2003: Robot Soccer World Cup VII*. XVI, 767 pages. 2004.
- Vol. 3012: K. Kurumatani, S.-H. Chen, A. Ohuchi (Eds.), *Multi-Agents for Mass User Support*. X, 217 pages. 2004.
- Vol. 3010: K.R. Apt, F. Fages, F. Rossi, P. Szeredi, J. Vánca (Eds.), *Recent Advances in Constraints*. VIII, 285 pages. 2004.
- Vol. 2990: J. Leite, A. Omicini, L. Sterling, P. Torroni (Eds.), *Declarative Agent Languages and Technologies*. XII, 281 pages. 2004.
- Vol. 2980: A. Blackwell, K. Marriott, A. Shimojima (Eds.), *Diagrammatic Representation and Inference*. XV, 448 pages. 2004.
- Vol. 2977: G. Di Marzo Serugendo, A. Karageorgos, O.F. Rana, F. Zambonelli (Eds.), *Engineering Self-Organising Systems*. X, 299 pages. 2004.
- Vol. 2972: R. Monroy, G. Arroyo-Figueroa, L.E. Sucar, H. Sossa (Eds.), *MICAI 2004: Advances in Artificial Intelligence*. XVII, 923 pages. 2004.
- Vol. 2969: M. Nickles, M. Rovatsos, G. Weiss (Eds.), *Agents and Computational Autonomy*. X, 275 pages. 2004.
- Vol. 2961: P. Eklund (Ed.), *Concept Lattices*. IX, 411 pages. 2004.
- Vol. 2953: K. Konrad, *Model Generation for Natural Language Interpretation and Analysis*. XIII, 166 pages. 2004.
- Vol. 2934: G. Lindemann, D. Moldt, M. Paolucci (Eds.), *Regulated Agent-Based Social Systems*. X, 301 pages. 2004.
- Vol. 2930: F. Winkler (Ed.), *Automated Deduction in Geometry*. VII, 231 pages. 2004.
- Vol. 2926: L. van Elst, V. Dignum, A. Abecker (Eds.), *Agent-Mediated Knowledge Management*. XI, 428 pages. 2004.
- Vol. 2923: V. Lifschitz, I. Niemelä (Eds.), *Logic Programming and Nonmonotonic Reasoning*. IX, 365 pages. 2003.
- Vol. 2915: A. Camurri, G. Volpe (Eds.), *Gesture-Based Communication in Human-Computer Interaction*. XIII, 558 pages. 2004.
- Vol. 2913: T.M. Pinkston, V.K. Prasanna (Eds.), *High Performance Computing - HIPC 2003*. XX, 512 pages. 2003.
- Vol. 2903: T.D. Gedeon, L.C.C. Fung (Eds.), *AI 2003: Advances in Artificial Intelligence*. XVI, 1075 pages. 2003.
- Vol. 2902: F.M. Pires, S.P. Abreu (Eds.), *Progress in Artificial Intelligence*. XV, 504 pages. 2003.
- Vol. 2892: F. Dau, *The Logic System of Concept Graphs with Negation*. XI, 213 pages. 2003.
- Vol. 2891: J. Lee, M. Barley (Eds.), *Intelligent Agents and Multi-Agent Systems*. X, 215 pages. 2003.
- Vol. 2882: D. Veit, *Matchmaking in Electronic Markets*. XV, 180 pages. 2003.
- Vol. 2872: G. Moro, C. Sartori, M.P. Singh (Eds.), *Agents and Peer-to-Peer Computing*. XII, 205 pages. 2004.
- Vol. 2871: N. Zhong, Z.W. Raś, S. Tsumoto, E. Suzuki (Eds.), *Foundations of Intelligent Systems*. XV, 697 pages. 2003.
- Vol. 2854: J. Hoffmann, *Utilizing Problem Structure in Planning*. XIII, 251 pages. 2003.
- Vol. 2843: G. Grieser, Y. Tanaka, A. Yamamoto (Eds.), *Discovery Science*. XII, 504 pages. 2003.
- Vol. 2842: R. Gavalda, K.P. Jantke, E. Takimoto (Eds.), *Algorithmic Learning Theory*. XI, 313 pages. 2003.
- Vol. 2838: N. Lavrač, D. Gamberger, L. Todorovski, H. Blockeel (Eds.), *Knowledge Discovery in Databases: PKDD 2003*. XVI, 508 pages. 2003.
- Vol. 2837: N. Lavrač, D. Gamberger, L. Todorovski, H. Blockeel (Eds.), *Machine Learning: ECML 2003*. XVI, 50 pages. 2003.
- Vol. 2835: T. Horváth, A. Yamamoto (Eds.), *Inductive Logic Programming*. X, 401 pages. 2003.
- Vol. 2821: A. Günter, R. Kruse, B. Neumann (Eds.), *KI 2003: Advances in Artificial Intelligence*. XII, 662 pages. 2003.
- Vol. 2807: V. Matoušek, P. Mautner (Eds.), *Text, Speech and Dialogue*. XIII, 426 pages. 2003.

Table of Contents

The KMDL Knowledge Management Approach: Integrating Knowledge Conversions and Business Process Modeling	1
<i>Norbert Gronau, Claudia Müller, and Mathias Uslar</i>	
A JXTA-Based Framework for Mobile Cooperation in Distributed Knowledge Spaces	11
<i>Bernd Eßmann, Thorsten Hampel, Joanna Slawik, and Research Group "Spontaneous networking in virtual Knowledge Spaces"</i>	
Towards an Evaluation Framework for Knowledge Management Systems	23
<i>Folker Folkens and Myra Spiliopoulou</i>	
I-KNOW What You Will Know in Knowledge Management	35
<i>Klaus Tochtermann, Gisela Dösinger, and Ines Puntschart</i>	
Decision Aid to Support the Building of Competencies Development Scenarios Within Networks of SMEs	46
<i>Xavier Boucher and Emilie Lebureau</i>	
MiNet: Building Ad-Hoc Peer-to-Peer Networks for Information Sharing Based on Mobile Agents	59
<i>Takafumi Yamaya, Toramatsu Shintani, Tadachika Ozono, Yusuke Hiraoka, Hiromitsu Hattori, Takayuki Ito, Naoki Fukuta, and Kyoji Umemura</i>	
Using Text Mining to Create Actionable Knowledge: Application to Network Failure Incident Reports	71
<i>Joseph Williamson, Kevin Dooley, and Steven Corman</i>	
Shared Views on Mobile Knowledge – A Concept of a Graphical User Interface . .	82
<i>Joanna Slawik, Bernd Eßmann, Thorsten Hampel, and Research Group "Ad-hoc networking in virtual Knowledge Spaces"</i>	
Integrating Knowledge Management and Groupware in a Software Development Environment	94
<i>Ricardo A. Falbo, Daniel O. Arantes, and Ana C.C. Natali</i>	
Knowledge Management in Data and Knowledge Intensive Environments	106
<i>Ashesh Mahidadia and Paul Compton</i>	
Knowledge Management in an Enterprise-Oriented Software Development Environment	117
<i>Mariano Montoni, Gleison Santos, Karina Villela, Rodrigo Miranda, Ana Regina Rocha, Guilherme H. Travassos, Sávio Figueiredo, and Sômulo Mafra</i>	

Towards a Knowledge-Aware Office Environment	129
<i>Leslie Carr, Timothy Miles-Board, Gary Wills, Arouna Woukeu, and Wendy Hall</i>	
Evaluation of an Approach to Expertise Finding	141
<i>Yee-Wai Sim and Richard Crowder</i>	
Collaborative Knowledge Transfer by Annotating Documents	153
<i>Ruth Cobos and Johann Schlichter</i>	
Representing Knowledge Gaps Effectively	159
<i>Alan Belasco, Jon Curtis, Robert C. Kahlert, Charles Klein, Corinne Mayans, and Pace Reagan</i>	
Security Design, Organization Dynamics and Performance: More than Meets the Eye	165
<i>James A. Sena and Abraham B. Shani</i>	
Knowledge Exploitation from the Web	175
<i>David Riaño, Antonio Moreno, David Isern, Jaime Bocio, David Sánchez, and Laureano Jiménez</i>	
Developing an Integrated Retrieval System for Web Databases	186
<i>Jeong-Oog Lee, Heung Seok Jeon, Hyun-Kyu Kang, and Jinsoo Kim</i>	
Incremental Knowledge Management of Web Community Groups on Web Portals	198
<i>Yang Sok Kim, Sung Sik Park, Byeong Ho Kang, and Young Ju Choi</i>	
Automatic Generation of Taxonomies from the WWW	208
<i>David Sánchez and Antonio Moreno</i>	
Corporate Innovation Engines: Tools and Processes	220
<i>Kemal A. Delic and Mark T. Fulgham</i>	
Integration of Business Process Support with Knowledge Management – A Practical Perspective	227
<i>Birger Andersson, Ilia Bider, and Erik Perjons</i>	
Towards a Systematic Approach for Capturing Knowledge-Intensive Business Processes	239
<i>Matthias Trier and Claudia Müller</i>	
The Concept of Elimination of Barriers to the Implementation of Integrated Systems with the Use of I-CASE Tools	251
<i>Witold Chmielarz</i>	
XAROP: A Midterm Report in Introducing a Decentralized Semantics-Based Knowledge Sharing Application	259
<i>Christoph Tempich, Marc Ehrig, Christiaan Fluit, Peter Haase, Esteve Lladó Martí, Michal Plechawski, and Steffen Staab</i>	

Managing Knowledge Assets for NPD Performance Improvement: Results of an Action Research Project	271
<i>Daniela Carlucci and Giovanni Schiuma</i>	
Knowledge Management in the Semiconductor Industry: Dispatches from the Front Line	282
<i>Brian Donnellan</i>	
Incremental Knowledge Acquisition for Building Sophisticated Information Extraction Systems with KAFTIE	292
<i>Son Bao Pham and Achim Hoffmann</i>	
Ontologies Help Finding Inspiration: A Practical Approach in Multimedia Information Management	307
<i>Silvia Calegari and Marco Loregian</i>	
Enhancing Knowledge Management Through the Use of GIS and Multimedia ...	319
<i>Petros Belsis, Stefanos Gritzalis, Apostolos Malatras, Christos Skourlas, and Ioannis Chalaris</i>	
Mediating Ontologies for Communities of Practice	330
<i>Marc Spaniol and Ralf Klamma</i>	
Cross Media Retrieval in Knowledge Discovery	343
<i>Mathias Lux, Michael Granitzer, Wolfgang Kienreich, Vedran Sabol, Werner Klieber, and Walter Sarka</i>	
KM-SISO: An Approach for Knowledge Management in Civil Engineering	353
<i>Knut Hinkelmann, Fabian Probst, and Benoît Stempfrel</i>	
SemanticLIFE Collaboration: Security Requirements and Solutions – Security Aspects of Semantic Knowledge Management	365
<i>Edgar R. Weippl, Alexander Schatten, Shuaib Karim, and A. Min Tjoa</i>	
Issues in Moving to a Semantic Web for a Large Corporation	378
<i>Gary Wills, David Fowler, Derek Sleeman, Richard Crowder, Simon Kampa, Leslie Carr, and David Knott</i>	
Picture Languages in Intelligent Retrieval of Visual Data Semantic Information ..	389
<i>Marek R. Ogiela and Ryszard Tadeusiewicz</i>	
Towards an Ontology for Data in Business Decisions	397
<i>Wilfried Grossmann and Markus Moschner</i>	
FCA-Based Ontology Augmentation in a Medical Domain	408
<i>In-Cheol Kim</i>	
An Approach for the Efficient Retrieval in Ontology-Enhanced Information Portals	414
<i>Nenad Stojanovic</i>	

Assessing Knowledge Management with Fuzzy Logic 425
Gholamreza Khoshshima, Caro Lucas, and Ali Mohaghar

A Meta-service Framework for Knowledge Management 433
Robert Woitsch, Peter Höfferer, and Dimitris Karagiannis

Natural Language Expansion of Web Service Interoperability 441
Kurt Englmeier, Josiane Mothe, and Fionn Murtagh

Developing Cooperative Environment Web Services Based on Action Research .. 453
Renate Motschnig-Pitrik, Michael Derntl, and Juergen Mangler

Acquiring and Refining Class Hierarchy Design
of Web Application Integration Software 463
Satoshi Minegishi, Naoki Fukuta, Tadashi Iijima, and Takahira Yamaguchi

Implementation of Customer Service Management System
for Corporate Knowledge Utilization 475
*Thomas Hinselmann, Alexander Smirnov, Mikhail Pashkin, Nikolai Chilov,
and Andrew Krizhanovsky*

Constraint-Rules for Configuration Problems 487
Ulrich Geske

Using Hierarchical Knowledge Structures to Implement Dynamic FAQ Systems .. 496
*David Camacho, Maria Dolores Rodriguez-Moreno, Alberto López,
and César Castro*

Knowledge Management in Eco-tourism: A Case Study 508
Stefanos Karagiannis and Apostolos Apostolou

Author Index 523

The KMDL Knowledge Management Approach: Integrating Knowledge Conversions and Business Process Modeling

Norbert Gronau¹, Claudia Müller¹, and Mathias Uslar²

¹ University of Potsdam, Business Information Systems and Electronic Government,
14482 Potsdam, Germany

{NGronau, ClaMue}@rz.uni-potsdam.de
<http://www.uni-potsdam.de/u/wvinf>

² OFFIS e.V., Business Information and Knowledge Management, 26111 Oldenburg
Uslar@offis.de

<http://www.offis.de/bi/>

Abstract. This paper shows the KMDL Knowledge Management Approach which is based on the SECI and *ba* model by Nonaka and Takeuchi and the KMDL Knowledge modeling language. The approach illustrates the creation of knowledge with the focus on the knowledge conversions by Nonaka and Takeuchi. Furthermore, it emphasizes the quality of knowledge being embodied in persons and creates a personalization and socialization strategy which integrates business process modeling, skill management and the selection of knowledge management systems. The paper describes the theoretical foundations of the approach and practical effects which have been seen in the use of this approach.

1 Introduction

Knowledge management clearly has become more and more important since the beginning of the early nineties. Companies expect an improvement of the innovation capability and a significant increase in process efficiency. Globalization, increasing competition, more dynamic markets and shorter cycles in product development and innovation increase the need for a better adaptation to those environmental factors. These factors establish the need for a consequent adaptation of all business processes to existing and future market needs.

Knowledge processes are executed parallel but also linked to normal business processes in a ladder like structure. The knowledge processes are only slightly structured. Detecting, modeling, analyzing and finally optimizing those processes should be the long-term aim of a process-oriented knowledge management approach.

Knowledge and business processes are integrated and should be evaluated as a whole [1]. Business processes can be modeled and analyzed via the existing business process modeling methods. Furthermore, there are numerous approaches which take into consideration the knowledge within the company or the organization [21, 22]. Mapping static, explicit knowledge can only contribute little to a broad and integrated process-oriented knowledge management approach. Modeling the business processes and the processes of knowledge creation can ensure an effective and reasonable process-spanning knowledge flow.

The described problems and challenges have been the motivation to develop the knowledge modeling language KMDL (Knowledge Modeling Description Language)

[2] in order to model knowledge-intensive business processes with the KMDL-based software tool K-Modeler. The tool implementing the language in an early version has been integrated into an approach which is based on the knowledge management philosophies of Nonaka, Takeuchi and Konno. The definition of the term knowledge is based on the very ideas of Nonaka and Takeuchi [18]. The knowledge is bound to a person, it is indeed personal knowledge. This so called tacit knowledge cannot be expressed by formal methods. It is based in the employee's occupation, the proficiencies of each employee and his ideals, values and experiences. It is possible to analyze and model this knowledge through KMDL even if it is not directly used in the operational business process.

2 Theoretical Foundation of the Approach

2.1 Definition of Knowledge, the SECI Model and *ba*

Nonaka and Takeuchi's thoughts and ideas are not only influenced by Japanese tradition but strongly by Michael Polanyi. Polanyi [20] defined the idea of a tacit knowledge embodied as personal knowledge. Therefore, Nonaka and Takeuchi distinguish between two types of knowledge: the tacit and the explicit knowledge. Tacit knowledge is personal knowledge which consists of mental models, beliefs and perspectives which cannot be easily articulated or shared. Explicit knowledge is formal, codified, systematic, articulated in writing/numbers, easy to communicate and shared; it is transmittable in a formal language and can be stored in databases or libraries [12].

The tacit knowledge is the more interesting knowledge when looking at knowledge-intensive business processes as we will see later. But yet, there are ways and possibilities to convert and combine tacit and explicit knowledge. Nonaka and Takeuchi mention four types of knowledge-conversions in the so called SECI model, the socialization, the externalization, the combination and the internalization.

The socialization is a conversion from tacit knowledge to tacit knowledge. Often it is done by sharing experience, just like apprentices of a craftsman learn their skills by watching a knowledge-worker can learn his needed abilities through on-the-job training. Even if possible, the socialization can be done without speaking or writing a single word.

The externalization is a conversion from tacit to explicit knowledge. By using metaphors, analogies or models one can express his tacit knowledge in a manner which can be understood by others. It is the essence of tacit knowledge which can then be handed over in a written form, yet it can be very difficult to externalize tacit knowledge, often it is simply impossible.

The combination is the conversion from explicit to explicit knowledge. Different kinds of explicit knowledge can be combined through media like telephone, mail, word processing by reconfiguring, categorizing and adding new information and context to the knowledge.

The internalization is the conversion from explicit to tacit knowledge. It is very close related to learning-by-doing. Experiences made through socialization, externalization or combination are internalized and put into one's own knowledge framework, they can become know-how or mental models and according to this, very important knowledge assets. It is very helpful if the explicit knowledge is in a written form like documents, handbooks or stories.

Those conversions are done regularly in everybody's daily life. Yet the idea is often neglected, because the conversions are bound to a place and depend on certain conditions and requirements. The idea has been adopted by Takeuchi and Konno [19]. The concept of *ba* creates the idea of this place. The *ba* is a shared location or place where relations can evolve. The place can be either physical (including bureau, shared workroom, mall) or virtual (email or teleconferences) or even mental (shared values, ideas, or ideals). The *ba* restrains itself from the ordinary human interaction by being a place of knowledge creation. Knowledge is bound to the *ba*, if it is dislodged from the *ba*, it simply becomes information. The *ba* is the framework where knowledge becomes the resource for creativity.

The model by Nonaka, Takeuchi and Konno establishes a logical framework which can be used to take a look at tacit and explicit knowledge, the conversions between those kinds of knowledge and therefore the creation of knowledge and the conditions and requirements for conversion to happen (the *ba*). It will serve as the basic framework for modeling a dynamic process of knowledge creation within the author's approach.

2.2 Definition of Knowledge-Intensive Business Processes

Several definitions of knowledge-intensive business processes have evolved. Remus first of all distinguishes four types of knowledge-oriented processes. A knowledge-intensive process is super-ordinate to the other processes in order to distinguish them from normal business processes [3]. The knowledge-intensive business process is a process which relies very much on knowledge like research and development processes. Remus defines two more processes which rely on knowledge [22]. The knowledge-process which is a process combining different knowledge activities like creating and distributing knowledge, for example the content management process and finally the knowledge-management process which tries to improve knowledge processes. The knowledge-intensive business process is subject to the definition of knowledge-intensive processes within this paper.

The literature defines several factors which are fundamental to knowledge-intensive business processes. In knowledge-intensive processes, knowledge contributes significantly to the values added within the process. The process has got many innovative and creative parts [5]. People within the process have a large scope of decision freedom, they can decide autonomous. The event flow of knowledge-intensive business processes is not clear from the very beginning, it can evolve during the process [3]. Many participants of the process have got different knowledge from different domains at different levels [11]. Like the flow, even the tasks within the process do not have to be clearly defined. A high level of communication between individuals is often part of the knowledge-intensive process. Knowledge which is part of the process has often a very short life-time [5], it is outdated very often, even though, it is more often very time-intensive to build up this knowledge [23]. Knowledge-intensive business processes often do not cover structured working rules and often lack metrics for evaluating the success of the process [4]. The IT-support for knowledge-intensive business processes is often not very sophisticated because it heavily relies on socialization and informal exchange [14]. A knowledge-intensive process should be a core process of the company and it should produce or add new knowledge to the organiza-

tion's knowledge base [15]. A last criterion focuses on the very high costs which are often generated by knowledge-intensive processes.

Looking at these criteria, we can classify many processes, for example software development processes [17] or public administration processes as knowledge-intensive processes. The very vague and unstructured flows of knowledge cannot be modeled by conventional modeling tools. Important elements like the representation of tacit knowledge or the creation of knowledge through conversions cannot be modeled [7].

2.3 Knowledge Strategy

Hansen et al. have established the idea of the knowledge strategy [13]. They distinguish between two main strategies which are often combined but are in general two poles for knowledge management approaches. The *codification strategy* tries to track the knowledge of the employees or other stakeholders with interviews or analogue techniques and to save this knowledge by electronic means and measures within databases. By retrieving from those databases, knowledge can be used again and again within new processes and situations. According to the definition by Nonaka and Takeuchi, this so called "knowledge" is indeed just information. This approach is far more an information management approach than a real knowledge management approach. The focus is on documenting situational knowledge from projects in order to reuse this knowledge like lessons-learned or best-practice documents over and over again (the so called people-to-documents approach).

The are within the focus of this strategy. A successful strategy for knowledge management of knowledge-intensive processes should focus on a combined personalization and socialization strategy.

Looking at the previous paragraph, we can see that knowledge-intensive business processes deal very much with creating and using tacit knowledge from many participants. An integrated approach should focus first of all on the *ba*-concept of places or processes where knowledge is created, the difference between tacit and explicit knowledge and focus on the factors of knowledge-intensive processes which are very much driven and fulfilled by the SECI knowledge conversions. Furthermore, the general strategy should be a combination of personalization and socialization, we should be able to identify tacit knowledge bound to persons as well as identifying processes within the organization creating knowledge and supporting the creation by appropriate (knowledge management) solutions or practices. The three types of knowledge processes according to Remus should be supported, if it is possible to model and support knowledge-intensive processes, the subordinate processes can be modeled, too. Our approach to fulfill those requirements is the KMDL. second strategy is the *personalization strategy*, which focuses on tacit knowledge. This knowledge is bound to several experts within the process or company. The strategy tries to identify the experts and to connect or visualize them through methods like yellow pages or knowledge maps. The communication between experts should be improved. The codification strategy does not seem to be appropriate for knowledge-intensive processes; the personalization strategy can be suitable if it is expanded by some more elements which is sometimes called *socialization strategy* [6].

This strategy focuses on the exchange and creation of knowledge within groups. Knowledge is a social product made within an environment [24]. The settings of the environment and the organization.

3 The Knowledge Modeling Description Language

The elements and mechanisms have been discussed in several other publications and the literature [9, 10]; we will therefore only discuss the core elements which are basis to the mentioned practical benefits in the third section of this paper.

3.1 Objects

The actual implementation of the KMDL consists of six objects: information, task, role, role requirement, knowledge object and person. The relation of those objects can be seen in Figure 1.

The information object is used in a process like any other information or explicit knowledge. Information can be externalized easily. It can be saved to disk or written down in documents.

The task object is the core element of the process model. A task is defined in this context as an object within the business process having input and output and being a single step within the whole superior process. Knowledge-intensive processes often process a lot of information, the input and outputs of the task therefore are information objects.

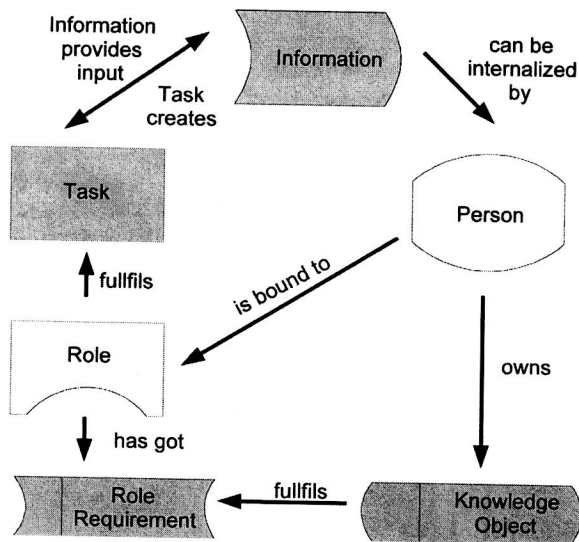


Fig. 1. Objects of KMDL

The role object is bound to tasks and roles execute the tasks. Roles can be taken and assigned to several persons. This provides the possibility to model the whole functional and personal company structure.