



A3-D7

Personalization for the Semantic Web III

Project title:	Reasoning on the Web with Rules and Semantics
Project acronym:	REWERSE
Project number:	IST-2004-506779
Project instrument:	EU FP6 Network of Excellence (NoE)
Project thematic priority:	Priority 2: Information Society Technologies (IST)
Document type:	D (deliverable)
Nature of document:	O (other)
Dissemination level:	PU (public)
Document number:	IST506779/Hannover/A3-D7/D/PU/b1
Responsible editors:	Nicola Henze
Reviewers:	Matteo Baldoni, Cristina Baroglio, Lilia Cheniti-Belcadhi
Contributing participants:	Hannover, Turin, Malta, Vienna, Warsaw
Contributing workpackages:	A3
Contractual date of deliverable:	October 1, 2006
Actual submission date:	September 15 2006

Abstract

This report provides an overview of the achievements of working group A3 for bringing personalization functionality to the Semantic Web. It continues the work started in the deliverable A3-D1 and A3-D4. In the deliverable at hand, we report on a successfully held workshop on *Semantic Web Personalization* at the 3rd European Semantic Web Conference, and the research results on techniques and algorithms for enabling personalization in the Semantic Web, and achievements on developing suitable architectures for the personalized information systems in the Semantic Web.

Keyword List

personalization, semantic web, web services, agents

Project co-funded by the European Commission and the Swiss Federal Office for Education and Science within the Sixth Framework Programme.

© REWERSE 2006.

Personalization for the Semantic Web III

Charlie Abela¹, Matteo Baldoni², Cristina Baroglio², Robert Baumgartner³, Ingo Brunkhorst⁴, Nicola Henze⁴, Mieczysław A.Kłopotek⁵, Alberto Martelli², Matthew Montebello¹, Viviana Patti², Sławomir T.Wierzchoń⁵

¹Department of Computer Science and AI – University of Malta
Tal-Qroqq – Msida MSD 06 – Malta G.C.
charlie.abela@um.edu.mt, mmont@cs.um.edu.mt

²Dipartimento di Informatica — Università degli Studi di Torino
C.so Svizzera, 185 — I-10149 Torino (Italy)
{baldoni,baroglio,martelli,patti}@di.unito.it

³Institut für Informationssysteme
Technische Universität Wien, Austria
baumgart@dbai.tuwien.ac.at

⁴Research Center L3S &
ISI- Knowledge-Based Systems, University of Hannover,
Appelstr. 4, D-30167 Hannover, Germany
{brunkhorst,henze}@l3s.de

⁵Institute of Computer Science – Polish Academy of Sciences
Ordonia 21, 01-237 Warsaw, Poland
klopotek@ipipan.waw.pl, stw@ipipan.waw.pl

September 15 2006

Abstract

This report provides an overview of the achievements of working group A3 for bringing personalization functionality to the Semantic Web. It continues the work started in the deliverable A3-D1 and A3-D4. In the deliverable at hand, we report on a successfully held workshop on *Semantic Web Personalization* at the 3rd European Semantic Web Conference, and the research results on techniques and algorithms for enabling personalization in the Semantic Web, and achievements on developing suitable architectures for the personalized information systems in the Semantic Web.

Keyword List

personalization, semantic web, web services, agents

Contents

1	Executive Summary	1
2	Semantic Web Personalization Workshop	1
3	Personalization for the Semantic Web: Techniques & Algorithms	4
3.1	Agent technologies for personalization	4
3.2	Web Service technologies for personalization	4
3.3	Personalization algorithms and strategies	4
3.4	Data capturing for the Semantic Web	6
4	Personalization for the Semantic Web: Architectures	6
4.1	Web Service-based architectures	6
4.2	Portals	6
5	Conclusion	7
6	Acknowledgment	7

1 Executive Summary

The work in working group A3 is centered around three axes: In the first axis, we research foundations for personalization and adaptation in the Semantic Web, and in particular aim at logical frameworks for describing and characterizing appropriate personalization functionality. This axis is therefore called *Adaptive Functionality*. The second axis is on deploying personalization functionality in systems and prototypes – the *Testbeds*-axis. In the third axis, we develop a personalized information system for the Semantic Web: a *personalized Web portal* for the REWERSE network.

This report belongs to the Adaptive Functionality axis and provides an overview of the achievements of working group A3 on researching personalization functionality for the Semantic Web, *Personalization for the Semantic Web* for short. Main achievements of A3 are the works on encapsulating *functionality for personalization* in a self-describing and self-organizing manner, and the development of suitable architectures for employing encapsulated personalization functionality in Semantic Web applications.

The deliverable reports on

1. the workshop on "*Semantic Web Personalization*", which was held at the 3rd European Semantic Web Conference", Budva, Montenegro, June 2006, organized jointly by members of the working group A3 of the NoE REWERSE, and Motorola (see section 2),
2. research papers showing progress on designing suitable personalization approaches for the Semantic Web (see section 3, *Personalization for the Semantic Web: Techniques & Algorithms*), and
3. research papers showing progress on developing architectures for realizing personalized information systems (see section 4, *Personalization for the Semantic Web: Architectures*).

2 Semantic Web Personalization Workshop

The ultimate goal of the Semantic Web is to enable applications which offer enhanced and efficient possibilities for end users to benefit from electronically stored information. The vision of a Semantic Web, *in which information is given a well-defined meaning, better enabling computers and people to work in cooperation* already stresses the importance of efficient end user support for accessing and working with Web information. However, current development in the Semantic Web focuses on formalisms, languages, reasoning and the development of according technological frameworks, so to speak the first part of the vision. These technologies shall constitute an environment capable of enabling enhanced, efficient and user-centered applications, thus enabling the second part of the vision, and the goal of the Semantic Web.

The Semantic Web Personalization workshop, which was held on June 12th, 2006, in Budva (Montenegro), in conjunction with the 3rd European Semantic Web Conference, brought together researchers and practitioners in the fields of Semantic Web technologies and personalization in order to discuss the emerging possibilities of realizing personalization in a Semantic Web. As personalization is not a new topic at all, the workshop's goal was especially to identify needs for personalization in the Semantic Web, but also experiences on personalized systems

and how personalization in the Semantic Web can benefit and learn from these experiences. Furthermore, of course, first applications and prototypes offering the users personalized experiences were proposed and discussed. The discussion notes of the workshop were published at <http://www.kbs.uni-hannover.de/~henze/swp06/discussionnotes.html>.

Program Committee

Pragya Agarwal, UCL, UK
Hamid R. Arabnia, The University of Georgia, USA
Lora Aroyo, Technical University of Eindhoven, Netherlands
Matteo Baldoni, University of Torino, Italy
Cristina Baroglio, University of Torino, Italy
Christian Becker, University of Stuttgart, Germany
Claudia Buzzi, Institute of Informatics and Telematics, Italy
François Carrez, Alcatel, France
Monica Crubezy, Stanford Medical Informatics, USA
Rose Dieng-Kuntz, INRIA Sophia Antipolis, France
Vania Dimitrova, University of Leeds, UK
Serge Garlatti, ENST Bretagne, France
Dominik Heckman, DFKI, Germany
Nicola Henze, University of Hannover, Germany
Pascal Hitzler, University of Karlsruhe, Germany
Paola Hobson, Motorola, UK
Geert-Jan Houben, Vrije Universiteit Brussel, Belgium
Anthony Jameson, International University in Germany
Judy Kay, University of Sidney, Australia
Yiannis Kompatsiaris, CERTH/ITI, Greece
Alexander Kroener, DFKI, Germany
Massimo Marchiori, University of Venice, Italy
Bamshad Mobasher, DePaul University, USA
Klaus Moessner, University of Surrey, UK
Viviana Patti, University of Torino, Italy
Myriam Ribière, Motorola, France
Alfons Salden, Telematica Instituut, Netherlands
Fabrizio Silvestri, Information Science and Technology Institute, Italy
Samir Tata, Institut National des Télécommunications, France
Julita Vassileva, University of Saskatchewan, Canada

Organizing Committee

Lora Aroyo, Technical University of Eindhoven, Netherlands
Makram Bouzid, Motorola, France
Bruno Defude - Institut National des Télécommunications, France
Vania Dimitrova, University of Leeds, UK
Olaf Droegehorn, University of Kassel, Germany

Nicola Henze, University of Hannover, Germany
Massimo Marchiori, University of Venice, Italy

Program Committee Chairs

Makram Bouzid, Motorola, France
Nicola Henze, University of Hannover, Germany

Workshop Proceedings

Accepted papers for this workshop focused on three thematic issues:

1. Reasoning for Personalization
 - M. Baldoni, C. Baroglio, A. Martelli, V. Patti, and L. Torasso: Verifying the compliance of personalized curricula to curricula models in the semantic web
 - T. Heath and E. Motta: Personalizing Relevance on the Semantic Web through Trusted Recommendations from a Social Network
2. Acquisition and application of user profiles
 - C. Abela and M. Montebello: PreDiCtS: A Personalised Service Discovery and Composition Framework
 - A. Ankolekar and D. Vrandečić: Personalizing web surfing with semantically enriched personal profiles
 - L. Hella and J. Krogstie: Semantic Web as enabling technology for m-commerce personalisation: Scenarios
 - Ph. Mylonas, D. Vallet, M. Fernández, P. Castells, and Y. Avrithis: Ontology-based Personalization for Multimedia Content
3. Architectures enabling Personalization in the Semantic Web
 - A. Aragonés, J. Bruno, A. Crapo, and M. Garbira: Using ACUIity to Personalize Content in Semantic Web Applications
 - L. Sauermann, A. Dengel, L. van Elst, A. Lauer, H. Maus, S. Schwarz: Personalization in the EPOS project

The proceedings were published in the workshop series of the 3rd European Semantic Web conference (one exemplar of the proceedings is accompanying this deliverable), and were made online available before the workshop took place at <http://www.kbs.uni-hannover.de/~henze/swp06/swp.pdf>.

3 Personalization for the Semantic Web: Techniques & Algorithms

3.1 Agent technologies for personalization

1. M. Baldoni, C. Baroglio, A. Martelli, V. Mascardi, V. Patti, C. Schifanella, L. Torasso: "Personalization, verification and conformance for logic-base communicating agents", Proc. of WOA 2005: Dagli oggetti agli agenti, simulazione e analisi formale di sistemi complessi, 2005, Camerino, Italy.
2. M. Baldoni, G. Boella, and L. van der Torre. Bridging Agent Theory and Object Orientation: Agent-like Communication among Object. In R. H. Bordini, M. Dastani, J. Dix, and A. Seghrouchni, editors, Proc. of the International Workshop on Programming Multi-Agent Systems, ProMAS 2006, pages 117-132, Hakodate, Japan, May 2006.
3. M. Baldoni, C. Baroglio, A. Martelli, and Patti. Verification of protocol conformance and agent interoperability. In F. Toni and P. Torroni, editors, Post-Proc. of Sixth International Workshop on Computational Logic in Multi-Agent Systems, CLIMA VI, volume 3900 of LNCS State-of-the-Art Survey, pages 265-283. Springer, 2006.
4. M. Baldoni, C. Baroglio, A. Martelli, V. Patti, and C. Schifanella. Interaction Protocols and Capabilities: a preliminary report. In J. J. Alferes, J. Bailey, W. May, and U. Schwertel, editors, Proc. of the 4th International Workshop on Principle and Practice of Semantic Web Reasoning, PPSWR 2006, pages 61-75, Budva, Montenegro, June 2006.

3.2 Web Service technologies for personalization

1. Matthew Montebello, Matthew Buckle and Charlie Abela: "A BPEL Engine and Editor for the .NET framework", in proceedings of the ECOWS 2005, Vxj, Sweden, November 2005
2. Fabian Abel, Robert Baumgartner, Adrian Brooks, Christian Enzi, Georg Gottlob, Nicola Henze, Marcus Herzog, Matthias Kriesell, Wolfgang Nejdl, Kai Tomaschewski: The Personal Publication Reader. Semantic Web Challenge, 4th International Semantic Web Conference, November 6-10 2005, Galway, Ireland.
3. M. Baldoni, C. Baroglio, A. Martelli, V. Patti, and L. Torasso. Verifying the compliance of personalized curricula to curricula models in the semantic web. In M. Bouzid and N. Henze, editors, Proc. of the Semantic Web Personalization Workshop, held in conjunction with the 3rd European Semantic Web Conference, pages 53-62, Budva, Montenegro, 2006.
4. M. Baldoni, C. Baroglio, A. Martelli, V. Patti: "Reasoning about interaction protocols for customizing web service selection and composition", Journal of Logic and Algebraic Programming, special issue on Web Services and Formal Methods, 2006, to appear.

3.3 Personalization algorithms and strategies

1. M.A. Kłopotek, S.T. Wierzchoń, K. Ciesielski, M. Dramiński, D. Czerski: Adaptacyjność i skalowalność map dokumentów. To appear in : A. Wakulicz-Deja: "Systemy wspoma-

- gania decyzji” Materiay Konferencji Naukowej , Zakopane, 6-8.12.2005. Wyd. Instytut Informatyki Uniwersytetu Skiego, Sosnowiec/Katowice
2. Matthew Montebello, Bjorn Azzopard: ”Web Services Platform”, in proceedings of the IADIS International Conference WWW/Internet, Lisbon, Portugal, (2005)
 3. Matthew Montebello, Eric Bonnici: ”DIINS: A Domain Independent Information and Navigation System”, in proceedings of the IADIS International Conference WWW/Internet, Lisbon, Portugal, (2005)
 4. Matthew Montebello, Joshua Ellul: ”MCommerceFx: A Mobile Commerce Framework”, in proceedings of the IADIS International Conference WWW/Internet, Lisbon, Portugal, (2005)
 5. Matthew Montebello, Caroline Grima: ”Mobile Scheduling Assistant”, in proceedings of the IADIS International Conference WWW/Internet, Lisbon, Portugal, (2005)
 6. K. Ciesielaski , M.Kłopotek: Contextual Maps for browsing Huge Document Collections, to appear in Proc. ISMIS2006
 7. Ciesielski, Wierzchon, Kłopotek: An immune network for contextual text data clustering, to appear in proc. ICARIS2006
 8. Mieczysław A.Kłopotek, Sławomir T.Wierzchoń,Krzysztof Ciesielski, Michał Dramiński, Dariusz Czerski: Map-based organization of hyperlinked document collections. To appear in EC-Web2006
 9. Nicola Henze: Personalized e-Learning in the Semantic Web. First International Conference on Interactive Mobile and Computer Aided Learning, Amman, Jordan, April 19-21 2006.
 10. Nicola Henze: Personalized e-Learning in the Semantic Web. International Journal of Emerging Technologies in Learning (iJET), Vol. 1, No. 1 (2006).
 11. Mieczysław A. Kłopotek, Krzysztof Ciesielski, Dariusz Czerski, Michał Dramiński, Sławomir T. Wierzchoń: BEATCA: map-based intelligent navigation in WWW. To appear in proc. AIMS 2006, Varna
 12. Mieczysław A. Kłopotek, Sławomir T. Wierzchoń, Krzysztof Ciesielski, Michał Dramiński, Dariusz Czerski: Techniques and Technologies Behind Maps of Internet and Intranet Document Collections to appear in: Jie Lu , Da Ruan , Guangquan Zhang eds: E-Service Intelligence – Methodologies, Technologies and Applications. Part II: Methodologies, Technologies and Systems (To be published in the Springer’s book series on Computational Intelligence in 2006)
 13. Nicola Henze: Personalisierbare Informationssysteme im Semantic Web. In T. Pellegrini, A. Blumauer (Hrsg.): Semantic Web: Wege zur vernetzten Wissensgesellschaft. Springer, 2006, ISBN 3-540-29324-8.

3.4 Data capturing for the Semantic Web

1. Stefania Ghita, Nicola Henze, Wolfgang Nejdl: Task Specific Semantic Views: Extracting and Integrating Contextual Metadata from the Web . 1st Workshop on "The Semantic Desktop - Next Generation Personal Information Management and Collaboration Infrastructure", 4th International Semantic Web Conference, November 6-10 2005, Galway, Ireland.
2. Tamir Hassan, Robert Baumgartner: Using Graph Matching Techniques to Wrap Data from PDF Documents (WWW 2006 Demo/Poster)
3. Bernhard Kruepl, Marcus Herzog: Visually Guided Bottom-Up Table Detection and Segmentation in Web Documents (WWW 2006 Demo/Poster)
4. Kurt Reichinger, Robert Baumgartner, Gerd Reichinger: Applications Utilising the PHOAF Prototype for Integrated ENUM and FOAF Queries (IRMA 2006)

4 Personalization for the Semantic Web: Architectures

4.1 Web Service-based architectures

1. Lilia Cheniti-Belcadhi, Nicola Henze, Rafik Braham: Towards a Service Based Architecture for Assessment. Proceedings of the Thirteenth GI-Workshop on Adaptation and User Modeling in interactive Systems (ABIS 05), October 2005, Saarbrücken, Germany.
2. Nicola Henze: E-Learning in the Semantic Web: The Personal Learning Object Readers. Joint Workshop of Cognition and Learning through Media-Communication for Advanced E-Learning II (JWCL2), September 28-30 2005, Tokyo, Japan.
3. F. Abel, I. Brunkhorst, N. Henze, D. Krause, K. Mushtaq, P. Nasirifard and K. Tomaschewski: Personal Reader Agent, to appear.
4. C. Abela and M. Montebello: "PreDiCtS: A Personalised Service Discovery and Composition Framework". In M. Bouzid and N. Henze, editors, Proc. of the Semantic Web Personalization Workshop, held in conjunction with the 3rd European Semantic Web Conference, pages 53-62, Budva, Montenegro, 2006.

4.2 Portals

1. Matthew Montebello and Malcolm Attard: "The Domotic Network Portal" in proceedings of the IADIS International Conference eSociety 2005, Qawra, Malta, (2005)
2. Matthew Montebello, Simon Scerri, Charlie Abela: "semantExplorer: A Semantic Web Browser, in proceedings of the IADIS International Conference WWW/Internet 2005, Lisbon Portugal, October 2005
3. Matthew Montebello, Malcolm Attard: "The DoNet Project", in proceedings of the IADIS International Conference WWW/Internet, Lisbon, Portugal, (2005)
4. Fabian Abel, Nicola Henze: User Awareness and Personalization in Semantic Portals. Demonstration Paper, 4th International Semantic Web Conference, November 6-10 2005, Galway, Ireland.

5 Conclusion

Facilitating personalized access to information in a Semantic Web is still a challenging issue. Working group A3 has contributed to both theoretical insights and practical solutions for suitable personalization strategies for the Semantic Web, and has investigated on enabling technologies and architectures. This report summarizes the achievements of working group A3 on disseminating knowledge on personalization for the Semantic Web (with an international workshop organized by A3), and research papers focussing on agent technologies and Web Services to enable personalization functionality in the Semantic Web, personalization algorithms and strategies, data gathering, and Web Service and Portal-based architectures for personalized information systems.

6 Acknowledgment

This research has been co-funded by the European Commission and by the Swiss Federal Office for Education and Science within the 6th Framework Program project REVERSE number 506779 (cf. <http://reverse.net>).