

Ulrich Reimer  
Dimitris Karagiannis (Eds.)

LNAI 4333

# Practical Aspects of Knowledge Management

6th International Conference, PAKM 2006  
Vienna, Austria, November/December 2006  
Proceedings

TP182-53  
P152  
2006

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Springer



E2007000049

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Ulrich Reimer  
University of Applied Sciences St. Gallen  
Institute for Information and Process Management  
Teufener Strasse 2, 9000 St. Gallen, Switzerland  
E-mail: ulrich.reimer@fhsg.ch

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

Library of Congress Control Number: Applied for

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

LNCS Sublibrary: SL 7 – Artificial Intelligence

ISSN 0302-9743  
ISBN-10 3-540-49998-9 Springer Berlin Heidelberg New York  
ISBN-13 978-3-540-49998-5 Springer Berlin Heidelberg New York

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Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India  
Printed on acid-free paper SPIN: 11944935 06/3142 5 4 3 2 1 0

**Lecture Notes in Artificial Intelligence**

**4333**

Edited by J. G. Carbonell and J. Siekmann

**Subseries of Lecture Notes in Computer Science**

# Preface

The biennial PAKM Conference Series offers a communication platform and meeting ground for practitioners and researchers involved in developing and deploying advanced business solutions for the management of knowledge in organizations. PAKM is a forum for people to share their views, exchange ideas, develop new insights, and envision completely new kinds of knowledge management solutions.

PAKM 2006, the Sixth International Conference on Practical Aspects of Knowledge Management, was held again in Vienna. It was a milestone for two reasons: First, it marked an anniversary – 10 years of PAKM conferences. The first conference was held in Basel, Switzerland, in 1996, followed by the conferences in 1998 and 2000, in Basel as well. After that PAKM moved to Vienna where it was held in 2002, 2004, and 2006.

Secondly, from now on PAKM will be “on tour”: It will be organized by different people and be hosted at different places all over the world. The PAKM Steering Committee will be responsible for selecting the conference chairs and the conference locations. The Steering Committee will also be responsible for the direction the PAKM conferences will take and will ensure their continuing high quality.

For this year’s conference we received 123 submissions from 30 countries. Based on the reviews by the members of the Program Committee and the additional reviewers, 29 papers were selected. They cover a great variety of approaches to knowledge management, which tackle the topic from many different angles. It is this very diversity that makes PAKM unique, while at the same time focussing on the one issue of managing knowledge within organizations.

Many people were involved in setting up PAKM 2006. 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, the members of the Program Committee and the additional reviewers who made such an effort to select the best papers and to ensure a high-quality program. Our thanks also go to Xiulian Benesch, who was responsible for all the organizational work and the University of Vienna for providing an excellent environment for the conference.

November 2006

Ulrich Reimer  
Dimitris Karagiannis

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# Web Service Based Business Processes Automation Using Semantic Personal Information Management Systems – The Semantic Life Case

Amin Anjomshoaa, Tho Manh Nguyen, Ferial Shayeganfar, and A Min Tjoa

Institute of software technology and Interactive Systems  
Vienna University of Technology  
Favoritenstrasse 9-11, 1040 Vienna, Austria  
{andjomshoaa, tho, ferial, amin}@ifs.tuwien.ac.at  
<http://www.ifs.tuwien.ac.at>

**Abstract.** Business today is the crossing point of information which are originated or deducted from different information resources. The process of assembling pieces of functionality into complex business processes very often necessarily involves human interaction which in turn heavily depends on environment and domain-specific Knowledge.

This paper deals with the use of Personal Information Management Systems and Semantic Web technology as enabler of business processes to realize the auto-interaction of customized processes, resources and events. Using an approach to integrate Semantic Filters in the proposed “*business pipelines*”, it is possible to address the most important issues of Process Integration and Process Automation.

The paper presents the SemanticLIFE research project and its applications in the tourism domain for business process automation by providing semantics for business pipelines and localization of process pipelines based on the semantics of Personal Information of potential clients. We will also provide a solution for automatic service orchestration of semantic services as semantic pipelines. Finally, we propose the Semantic Ranking model to evaluate the Semantic Matching in a typical tourism recommendation scenario.

## 1 Introduction

The fast growth of the World Wide Web and the emerging pervasiveness of digital technologies within our information society have significantly revolutionized business transactions, trade and communication between people and organizations. [3]. Besides the augmentation effect, business-related information is characterised by the fact that it also originates from heterogeneous sources and get more and more complex in structure, semantic and communication standard. Therefore, mastering heterogeneity becomes a more and more challenging issue for research in the area of Business Process Management. This challenge involves all facets of process integration, composition, orchestration, and automation amongst heterogeneous systems.

Web services [9], built on top of existing Web protocols and open XML standards, recently emerge as a systematic and extensible framework for application-to-application

interaction. Web services allow automatic and dynamic interoperability between systems to accomplish business tasks. However, due to the lack of the explicit semantic context, the process of assembling “pieces of functionality” into complex business processes is still unthinkable without significant human involvement.

Semantic Web [4], another emerging technology, is being increasingly applied in a large spectrum of applications in order to support diversified knowledge processing by machines. It is a paradigm shift to fulfil the goal of enabling machines to “*interpret*” and *automatically process* the data available on the Web. It has been applied in a variety of application-domains such as knowledge management, e-commerce, healthcare, e-government, data and services integration, searching, and so on.

In SemanticLIFE project [2], we use the Semantic Web technology to build up a long-term ontological Personal Information Management (PIM) system with the aim of creating a semantic repository of all personal data from a variety of sources like emails, contacts, running processes, web browsing history, calendar appointments, chat Sections, and other documents. This PIM system acts as a *digital memory* and provides the “*personal profile*” for acquired persons.

To our understanding, *Web Service* and *Semantic Web* technology are two sides of the same coin which could enable the automation and integration of business processes. Business services are implemented and distributed as web services. With the Semantic information (in our case: personal profile information), it is possible to automatically select customized (web) services, orchestrate them into one complex process and to finally execute the combined process. An example of such orchestration process automation is the Tourist Plan Recommender described in Section 4.

The remainder of the paper is organized as follows. Section 2 briefly reviews the state of the art of Recommender Systems. The SemanticLIFE project with its complete plug-in architecture is described in Section 3. Section 4 presents the integration of SemanticLIFE components with Business Process Execution Language for Web Services (BPEL4WS) standard. The Tourist Plan Recommender and its business pipelines are described in Section 5. In Section 6, we describe the Semantic Ranking method including the Frequency Ranking and Relevance Ranking. Finally, Section 7 concludes the paper with some evaluation discussion and sketch of future work.

## 2 Recommender Systems: The State of Art

Recommendations systems in the context of travel and tourism became increasingly important since the amount of available information is exploding and users are not always experienced in processing the multitude of information resources. Recommender systems are commonly viewed in the e-commerce domain as applications that are exploited to suggest products and provide consumers with information to facilitate their decision-making processes [13]. They can be classified into the following three types: (1) collaborative-filtering or social-filtering; (2) content-based and (3) knowledge-based [5].

Amazon can be considered as a very popular example of a collaborative-based filter. It collects user ratings on currently proposed products and/or previously purchased items to infer the similarity between users.

In content-based filtering, the user expresses needs and preferences on a set of attributes and the system retrieves the items that match the preferences. New Dudes can serve as an example for a content-based recommendation approach.

The knowledge-based recommender uses knowledge about users and products to build up a recommendation. It integrates both content-based and collaborative-based techniques. Knowledge-based recommender could be based on case based reasoning (CBR) [11]. CBR is a problem solving technology that faces the new problem or situation by first looking back into the past, already solved similar case and use it to solve the present problem. Triplehop's TripMatcher ([www.ski-europe.com](http://www.ski-europe.com)) and VacationCoach's expert advice platform, Me-Print (used by [travelocity.com](http://travelocity.com)) are examples of most successful CBR recommendation e-commerce sites [11].

Tourist recommender research efforts are conducted by many universities and organizations due to the necessity of packaging different tourism services for the user (e.g. flight services, car-rentals, hotel accommodation, cultural events etc.). The eCommerce and Tourism Research Laboratory (eCTRL) proposes DieToRecs [10] as a web-based recommendation system that will aid the tourist destination selection process and attempts to accommodate individual preferences. Trip@dvice [7] is another successful eCTRL project, which assists e-travellers in their search for tourism products on the internet. ITR [12]-Intelligence Travel Recommender- integrates case-based reasoning with interactive query management.

L. Ardissono et al. [8] propose Seta2000, an infrastructure for developing personalized recommender systems. They also proposed INTRIGUE [6], a recommendation technique which takes into account the characteristics of the group of participants and addresses possibly conflicting preferences within the group.

So far, most of the existing Recommender systems use traditional methods based on machine learning or case-based reasoning (CBR) techniques to issue the deduced recommendations. Most of them request the user to specify his/her interests and preferences to build up the user profile. Very few of them could “*remember*” the user behaviour or interest, even though some click stream analysis systems [14] keep the (short term) history of user's behaviour.

### 3 SemanticLIFE

SemanticLIFE [2], developed using the Eclipse Rich Client Platform (Eclipse RCP), is designed to store, manage and retrieve the *lifetime's information entities of individuals using ontologies*. It enables the acquisition and storage of data, giving annotations and retrieval of personal resources such as email messages, browsed web pages, phone calls, images, contacts. The ultimate goal of the project is to build a Personal Information Management system over a Human Lifetime using ontologies as a basis for the representation of its content. . Fig. 1 shows the basic components of SemanticLIFE. The dotted boxes denote the significant plug-ins of the use cases proposed in this paper.

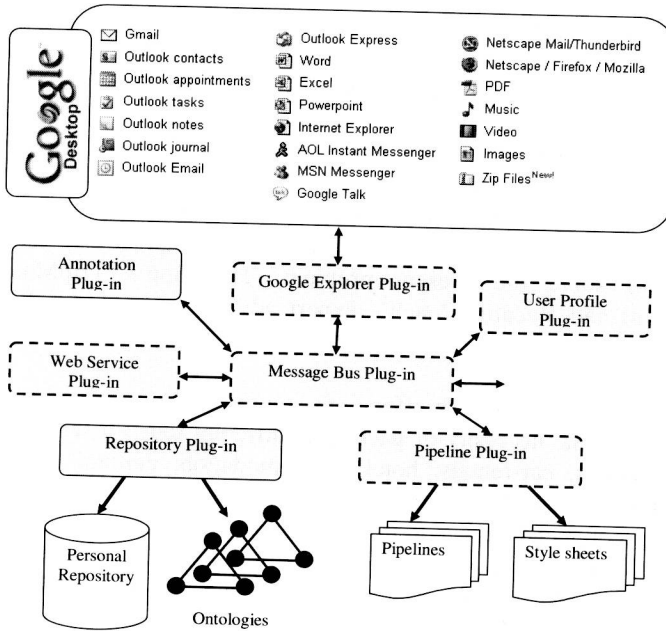


Fig. 1. SemanticLIFE System Architecture

### 3.1 SemanticLIFE User Profile

A plug-in is developed to import the Google Desktop's captured entities into SemanticLIFE's repository where they are ontologically stored in RDF metadata framework. This will then facilitate semantic meaningful queries, life trails, ranking and processing of life events. The user profile will be partly shaped from this activity logs. User demographics, user interests, contacts could be considered as the static part of the profile. These data will be gradually elaborated and enriched either by automatic or by manual annotation and additions. Fig. 2 shows a fragment of the user model used in the SemanticLIFE system.

This schema helps the system to create a matching behaviour model for user and enhance the user modelling in the following ways:

1. User will have a unique profile that can be reused for many business processes.
2. User model is dynamic and will be adjusted based on the long term user interactions. This approach gains advantages compared with the click-tracking mechanism that captures the user interactions for a limited period on a few web pages.

### 3.2 SemanticLIFE's Plugins

SemanticLIFE is built upon on several plug-ins components which communicate via the messaging and collaboration component. Message Bus, Web Service and Pipeline plug-ins are the fundamental plug-ins support the communication framework.



