Preface

Very few trips in the process of evolution in information technology can be compared with the one of open source software. Millions of people worldwide are working collaboratively, exploiting each other's capacities and capabilities toward the achievement of significant milestones. Amazing networks of experts, knowledge communities, and multidisciplinary teams use innovative models of cooperation and collaboration and prove how knowledge and learning management can develop new unforeseen opportunities for sustainable development.

They develop excellent tools, applications, and solutions for diverse problems and needs, and they motivate more and more professionals and open minds to contribute to the enhancement of their developments. If you try to comment on this exciting community, then the first obvious conclusion is a single word: UNBELIEVABLE. Yes, it is really unbelievable how these people are "breaking" the rules of the commercial market, and how, without any financial compensation, they give their minds and souls for their "open software" project.

When we decided to edit this book, we knew from the beginning that this project would be a magnificent journey into the worlds of open knowledge and creative collaboration. It was not only because in the Knowledge Management Research Group, at the Royal Institute of Technology, (KMR Group, http://kmr.nada.kth.se) in the last years we have developed numerous open source-based tools for knowledge and learning management. It was mostly because the world of open source is full of brilliant ideas and shiny people who enjoy working for their tools and applications and sharing their knowledge and experiences. Traditionally, most studies on open source software have two alternative destinations and objectives. Either they discuss the success of open source structure and they try to transfer the findings

(social networking, shared vision, shared mental models, etc.) to business settings, or they analyze the qualitative characteristics of open source software.

With more than 50 contributors, this edition is really amazing. A wide range of issues is discussed with a clear focus. We want to communicate that open source for knowledge and learning management sets a brand new context for value creation in education, government, business, academia, research, culture, health, and so forth. Living in tough days where competition is increasingly global, the joint efforts of open source communities provide an alternative route for solutions to well-known problems. From a knowledge society's point of view, the bridging of the gap between knowledge creation and use requires the deployment of numerous infrastructures and social networks. The "Society of Active Citizens" is not a political verbalism. From a technological adoption perspective, open source solutions to knowledge and learning management have a clear advantage. They demonstrate how effective the knowledge and learning management can be if there is proper inspiration and strategy.

Definitely, open source software, and especially open source applications for knowledge and learning management, gain more attention from day to day. This edited book has a clear strategy and vision. We decided from the beginning to develop a book for the various segments of society that are interested in open source software approaches and their contextualization for knowledge and learning management. In fact, we developed a book not for the few experts, but for the entire society, and we are really proud of this.

This book also has a strategic fit within the Knowledge and Learning Society Book series of IGI. We decided for the first 2 years of the Series to concentrate on the emerging technologies and paradigm shifts that are challenging the development of the infrastructures of the knowledge and learning society. In fact, three editions summarize this strategic objective.

- **Intelligent Learning Infrastructure for Knowledge Intensive Organizations:** A Semantic Web Perspective [more info: http://www.idea-group.com/books/details.asp?id=4925].
- **Open Source for Knowledge and Learning Management:** Strategies Beyond Tools.
- **Ubiquitous and Pervasive Knowledge and Learning Management:** Semantics, Social Networking and New Media to Their Full Potential [already in bookstores/finished in parallel with the current edition].

We do believe that these three editions cover the most fascinating aspects of knowledge and learning management nowadays, and therefore can act as reference editions. Open source is here to stay. Not just because it is at the top of the list of the

research agenda for e-Europe and several similar political and government initiatives worldwide. But mostly because it demonstrates how collective intelligence can go beyond the capacities of isolated groups.

This edited book is about open source for knowledge and learning management. But, in fact, it is about realizing that when people are sharing the same visions and working together, then they can do great things.

Our vision goes a step further. We want a better world for all. And we are convinced that knowledge and learning is the TOTAL GLOBAL response to our competitive days.

We encourage you to be part of this exciting journey.

June 2006
Miltiadis D. Lytras
Ambjörn Naeve

Structure/Editing Strategy/Synopsis of the Book

When dealing with open source software, it is really of no sense to try to be exhaustive. Moreover, when you are trying to investigate the new insights of open source software and approaches to knowledge and learning management, then the mission becomes even more complex.

This is why, from the beginning, we knew that our book should be selective and focused. In fact, we decided to develop a book with characteristics that would help the reader to follow several different journeys through the contents. We also decided to open the book to big audiences. While we could pursue, through our excellent contacts and great network of collaborators, a publication aiming to promote the discipline, we decided that it would be most significant (from a value-adding perspective) to develop a reference book. And this is what we have done, with the support of great contributors: A reference book for open source for the knowledge and learning management community providing an excellent starting point for further studies on the topics.

Having already the experience of the edition of "Intelligent Learning for Knowledge Intensive Organizations: A Semantic Web perspective," and getting feedback from hundreds of researchers from all over the world, we decided to keep the same presentation strategy. We have tried, and we really think that we have succeeded, to develop a book that has three characteristics:

- It discusses the key issues of the relevant research agenda.
- It provides practical guidelines and presents several technologies.
- It has a teaching orientation.

The last characteristic is a novelty of our book. Several times editions like this one seem like a compilation of chapters, but without a clear orientation to the reader. This is why every edited chapter is accompanied by a number of additional resources that increase the impact for the reader.

In each chapter we follow a common didactic-learning approach:

- At the beginning of each chapter, the authors provide a section entitled *Inside Chapter*, which is an abstract-like short synopsis of their chapter.

At the end of each chapter there are some very interesting sections, where the reader can spend many creative hours. More specifically, the relevant sections are entitled:

- **Internet session:** In this section the authors present one or more Web sites, relevant to the discussed theme in each chapter. The short presentation of each Internet session is followed by the description of an *Interaction*, where the reader (student) is motivated to take a guided tour of the Web site and to complete an assignment.
- **Case study:** For each chapter, the contributors provide "realistic" descriptions of one case study, which the reader must consider in order to obtain strategic advice.
- **Useful links:** They refer to Web sites with content capable of exploiting the knowledge communicated in each chapter. We decided to provide these links in every chapter, even though we know that several of them will be broken in the future, since their synergy with the contents of the chapter can support the final learning outcome.
- **Further readings:** These refer to high-quality articles available both in Web and electronic libraries. We have evaluated these resources as of significant value, and we are sure that readers will find them significant.
- **Essays:** Under this section a number of titles for assignments are given. In the best case, essays could become working research papers. The general rule is that we provide three to six titles for essays, and in their abstract title, readers can find an excellent context of questioning.

The edited book consists of 13 chapters. We will try, in the next paragraphs, to give an overview of the contents, and also to explain the strategic fit of each chapter to our vision. In the Foreword, Professors Walt Scacchi and Joseph Hardin provide their personal understanding of the book, and highlights many uncovered themes. We are really grateful for, and honored by, their contributions.

Eirini Kalliamvakou, in *Open Source Software Basics: An Overview of a Revolutionary Research Context*, gives a nice introduction to the OSS context and presents several guidelines for further exploitation.

Christian Reinhardt and Andrea Hemetsberger in *Of Experts and Apprentices: Learning from the KDE Community*, provide the first significant insight for knowledge and learning management. Open source communities give manifestations on knowledge sharing, and expert support to peers and colleagues. According to their abstract:

Free and open source software (F/OSS) communities are self-organizing, social entities, which collaboratively create knowledge and innovate. Their fundamentally new approach of developing software challenges traditional principles of collaboration and learning. In contrast to well-organized and planned commercial projects, F/OSS development constitutes a continuous, iterative process of constant, incremental improvements made by various self-motivated contributors. Within such projects organizational structures emerge that enable a large number (i.e. hundreds or even thousands) of volunteers to commit themselves to freely chosen work, yet collaboratively realize a joint enterprise. The success of F/OSS communities genuinely depends on a constant flux of new members in order to ensure the sustainability. These aspirant members must be culturally integrated and taught in order to become expert members. This, in turn, increases complexity. Hence, these integration processes must be sophisticated, yet simple. Project coordination and new member integration, therefore, play a key role for the success of F/OSS communities. This is a challenging task, given that developers rarely meet face-to-face. New member integration takes place in online environments. It is their design and usage which are crucial for the success of such online efforts. The aim of this chapter is to discuss new member integration and learning, firstly in a theoretical manner by applying a 'communities of practice' perspective on F/OSS communities, and, secondly, by providing empirical evidence from the KDE project.

Organizations have much to learn from approaches like the ones described in the chapter by Reinhardt and Hemetsberger. The networked organization has to provide processes and systems that create a soft and hard infrastructure for the exploitation of knowledge wealth.

The *Luisa STREP* (Strategic Targeted Research Project) within EU/FP6, http://luisa.atosorigin.es/www (**L**earning Content Management System **U**sing **I**nnovative **S**emantic Web Services **A**rchitecture), where KMR (http://kmr.nada.kth.se) is a key partner, addresses the development of a reference semantic architecture for the major challenges in the search, interchange, and delivery of learning objects in a service-oriented context. From another point of view, it would be extremely challenging to exploit how semantic social networking with mobile and wireless networks expand the borders of communication. In our edited book *Ubiquitous and Pervasive Knowledge and Learning Management: Semantics, Social Networking and New Media to Their Full Potential* edited book, these topics are analyzed further.

Jörg Rech, Eric Ras and Björn Decker in *Riki: A System for Knowledge Transfer and Reuse in Software Engineering Projects*, elaborate further on the same context. Their chapter gives an overview of the reuse of knowledge and so-called learning components in software engineering projects, and raises several requirements one should keep in mind when building such systems to support knowledge transfer and reuse

Many software organizations have a reputation for producing expensive, low-quality software systems. This results from the inherent complexity of software itself, as well as from the chaotic organization of developers building these systems. Therefore, the authors set a stage for software development based on social software for knowledge and learning management to support reuse in software engineering, as well as knowledge sharing in and between projects. In the RISE (Reuse in Software Engineering) project, they worked with several German SMEs to develop a system for the reuse of software engineering products such as requirement documents. The methodology and technology developed in the RISE project makes it possible to share knowledge in the form of software artifacts, experiences, or best practices based on pedagogic approaches.

Rech, Ras and Decker are developing a new edited book entitled, *Emerging Technologies for Semantic Work Environments: Techniques, Methods, and Applications*, which we recommend to you.

Christian Höcht and Jörg Rech in *Human-Centered Design of a Semantically Enabled Knowledge Management System for Agile Software Engineering* provide an interesting methodology, which was developed during a German research project, and which enables and supports the design of knowledge sharing platforms, such as WIKIs, based on pedagogic standards and engineering techniques. Developing human-centered systems is considered by the authors as a challenge that addresses a wide area of expertise—computer scientists as well as social scientists. These experts have to work closely together in order to build intelligent systems to support agile software development.

Human-centered knowledge and learning management is also a key challenge. In a recent interview with the president of the Association for Information Systems, Michael Myers, he stated that “The field of IS has always been about RELATION-

SHIPS, not things in themselves" (interview available at http://www.srcf.ucam.org/~mpp26/miltos/MyersPDF.pdf). From this point of view, human-centered design requires a multifold analysis of parameters that justify a personalized approach to the management of tacit and explicit knowledge and learning.

Tom Butler, Joseph Feller, Andrew Pope and Ciaran Murphy in *Making Knowledge Management Systems Open: A Case Study of the Role of Open Source Software* give an excellent example on how open source can be the basis for open KM systems.

Their chapter presents an action research-based case study of the development of pKADS (portable knowledge asset development system), an open source, desktop-based knowledge management (KM) tool, implemented in Java and targeted at government and nongovernment organizations. pKADS was a collaborative project involving Business Information Systems, University College Cork, Ireland and the United Nations Population Fund (UNFPA), and it was funded by the government of Ireland. Development of the application took just 3 months, using an agile development approach and some reuse of existing open source code. The chapter discusses the background of the pKADS project and prior UNFPA KM efforts, the technical and conceptual architectures of the pKADS application, the roles played by open source components and open data standards, the rationale for releasing pKADS as open source software, and the subsequent results. Future research, in the form of developing open source, Intranet/Internet-based KM tools for the Government of Ireland—eGovernment Knowledge Platform (eGovKP) is also briefly discussed.

Christian Wernberg-Tougaard, Patrice-Emmanuel Schmitz, Kristoffer Herning, and John Gøtzeand in *Evaluating Open Source in Government: Methodological Considerations in Strategizing the Use of Open Source in the Public Sector* promote further the discussion of the previous chapter and concentrate on public sector and government's exploitation of F/OSS.

The use of free and open source software (F/OSS) in the public sector has been accelerating over the last 10 years. The benefits seem to be obvious: No licensing costs, unlimited flexibility, vendor independence, a support community, and so forth. But as with everything else in life, a successful implementation of F/OSS in government is not as simple as it might look initially. The implementation of F/OSS should build on a solid evaluation of core business criteria in all their complexity. The authors analyze the evaluation considerations that government bodies should undertake before deciding between F/OSS and traditional software (SW), including the way knowledge networks and communities of practice work, total cost of ownership, and core functional requirements. The chapter presents a methodology conceptualizing this process in a comprehensive framework, focusing on the interaction between the strategic and business process level and the SW/infrastructure level. The chapter aims at presenting a framework enabling IT-strategists and management from the "business side" of public sector institutions to evaluate F/OSS vs. traditional SW in tight cooperation with the IT-side of the organization.

Ernesto Damiani, Paul G. Mezey, Paolo M. Pumilia and Anna Maria Tammaro, in *Open Culture for Education and Research Environment*, discuss a key aspect of open source in the context of knowledge and learning management for research and education. (Have a look also at their great event in OSS 2006 – Workshop on Preserving Quality in an Open Environment, http://openculture.org/como-2006.)

More specifically in their chapter, emphasis is placed on the open source organizational model, highlighting some of the key elements of the open culture: knowledge sharing technologies, interoperability, reusability, and quality assurance. Some contemporary theoretical and technological issues that are becoming of paramount importance for building a cross-disciplinary research and knowledge-sharing environment are outlined, pointing out those cultural changes implied by the increasing adoption of the ICT. In the unprecedented abundance of information sources that can be reached through the Internet, the growing need for reliability will not be met without a major change of scholars', teachers', and learners' attitudes to foster enhanced trusted relationships.

Riina Vuorikari and Karl Sarnow, in *European National Educational School Authorities' Actions Regarding Open Content and Open Source Software in Education*, provide a reference chapter for all those interested in the policies and actions towards the deployment of FOSS at the European level.

Their chapter provides an overview of policies in the area of e-learning that 10 European countries, all members of European Schoolnet, have taken regarding open content and free and open source software (FOSS) to be used to support and enhance learning. Additionally, it elaborates on the European Schoolnet's initiatives to support open learning resource exchange in Europe. European Schoolnet (EUN, http://www.eun.org/portal/index.htm) promotes the use of information and communication technologies (ICT) in European schools acting as a gateway to national and regional educational authorities and school networks throughout Europe. A variety of actions have been initiated by a number of European educational authorities from analysis and feasibility studies to the development of educational software based on open source as well as open educational content.

Christos Bouras and Maria Nani, in *Using Open Source to Building and Accessing Learning Objects and Online Courses*, demonstrate how open source can be the basis for open LMSs. According to the authors, as e-learning continuously gains the interest of the scientific community, industry, and government, a wide variety of learning technology products have been incorporated into the market place. Advances in information and communication technologies are in favor of the incorporation of innovative services and functionalities in such systems, though content creation and delivery remain the two key factors in any e-learning system. Therefore, in this chapter, they present the design and implementation of a tool targeted at building and accessing learning objects and online courses through the Web.

This tool aims to facilitate instructors and trainers to easily develop accessible, reusable, and traceable learning content that can meet their distant students' needs

for anytime and anyplace learning. Learners are able to access learning content in addition to consulting, at any time, reports on their interactions within a course, and get support by subject experts. Furthermore, all users can request to upgrade their role in the system and, thus, actively participate in the learning process. Special attention has been paid to the utilization of reliable and qualitative open source technologies and Web standards so that the proposed solution can form an easily accessible system.

Neophytos Demetriou, Stefan Koch, and Gustaf Neumann, in *The Development of the OpenACS Community*, present OpenACS, with its community, as a case study documenting the forces acting between commercial interests, securing investments, and technical development in a large open source project with a large proportion of commercial involvement. OpenACS is a high-level community framework designed for developing collaborative Internet sites. It started from a university project at MIT, got momentum from the ArsDigita Foundation, and split up into a commercial and an non-commercial version based on open source. OpenACS has proven its durability and utility by surviving the death of its parent company (ArsDigita) to grow into a vibrant grassroots collection of independent consultants and small companies implementing diverse and complex Web solutions around the globe for NPOs, philanthropy, and profit. A heritage from this history is a still dominant position of contributors with commercial interests that, in its intensity, is above the norm found in open source projects.

Pascal Francq, in *The GALILEI Platform: Social Browsing to Build Communities of Interests and Share Relevant Information and Expertise*, gives an excellent example on how social browsing can be a key theme of knowledge and learning management in organizational settings and in humanistic computing.

For a few years, social software has appeared on the Internet to challenge the problem of handling the mass of information available. In this chapter, Francq presents the GALILEI platform, using social browsing to build communities of interests where relevant information and expertise are shared. The users are described in terms of profiles, with each profile corresponding to one specific area of interest. While browsing, users' profiles are computed on the basis of both the content of the consulted documents and the relevance assessments from the profiles. These profiles are then grouped into communities, which allows documents of interest to be shared among members of the same community, and experts to be identified.

Marcos A. Castilho et al., in *Making Government Policies for Education Possible by Means of Open Source Technology: A Successful Case*, provide an interesting case. We really love this chapter because we prefer, instead of just verbalisms and big visions, to see things working in daily tough life.

In their chapter, they describe the products and services offered by the Department of Computer Science of the Federal University of Paraná within the scope of the Paraná Digital project. The department has designed laboratories with Internet

access to 2,100 public schools of the state, with innovative technology, through an environment entirely based upon free software tools, centralized management as well as continuous maintenance, and betterment of the services offered. They place special emphasis on strategies, aiming at contributing to the adoption of such strategies in contexts relatively similar to theirs.

Finally, Marc Alier Forment, in *A Social Constructionist Approach to Learning Communities: Moodle*, discusses the influence of the main learning paradigms: conductism and constructivism. He comments also on the need to apply the OSS development model and licences to the creation of open content, to be collaboratively created in communities. The social reality of OSS communities that become learning communities is described by the principles of social constructionism; this paradigm has been applied in the creation of Moodle.org, a true learning community built around the OSS learning management system: Moodle. For sure, an excellent case study and a significant contribution to the book.

In the next section, there is a preface, developed by Professor Walt Scacchi, University of California, Irvine, CA, that highlights new destinations for studies on the organizational aspects of open source. We are really grateful and honored for his contribution.

Please find below a short list of FOSS applications developed in our Knowledge Management Research Group (KMR Group) in Royal Institute of Technology, Sweden (http://kmr.nada.kth.se).

We would be happy to build further collaborations for this enhancement.

Conzilla: A Concept Browser

Conzilla is a concept browser aiming to provide:

- An effective environment for collaborative knowledge management
- A flexible human-semantic interface for editing and presenting information on the machine-Semantic Web

Conzilla presents content in contexts through concepts. A concept is regarded as the boundary between its inside, which contains its content (components), and its outsides, which represent the different contexts in which the concept appears. A context is graphically represented in the form of a context-map. All elements in Conzilla can be equipped (annotated) with additional information (metadata). Typical content consists of Web pages, images, movies, references to books or geographical places, etc.

Right-clicking on a concept brings up a menu with three choices: Contexts, Content, and Information.

- Selecting Contexts opens a sub-menu, which lists all the other contexts where this concept appears.
- Selecting Content opens a window (to the right) where the content-components of the concept are listed. Pointing to a content-component brings up information about it, and double-clicking opens another window where the corresponding content is shown.
- Selecting Information brings up a window, which contains information (meta-data) about the concept, concept-relation or context under investigation.

The basic principles behind conceptual browsing have been developed by the KMR-group since 1997 under the lead of Ambjörn Naeve. Conzilla is developed under an open source license and provided at no cost. For more information see www.conzilla.org.

Collaborilla is a collaboration service within Conzilla, which will be released in early 2007. Collaborilla will enable the publication of different parts of collaboratively constructed context-maps from different sources. This will make it possible to:

- Reuse and extend concepts and concept-relations published by others; for example, students could refine “skeleton maps” published by teachers
- Create new context-maps that include existing concepts and concept-relations from other publishers
- Add content to others’ concepts, concept-relations and context-maps, in order to examplify ideas from other publishers
- Add comments (metadata) on others’ concepts, concept-relations and context-maps
- Perform agreement and disagreement management in the form of bottom-up conceptual calibration by building ”conceptual bridges” between different context-maps—thereby agreeing, disagreeing, commenting on, or refining existing concepts and/or concepts-relations

SHAME: A Library for Editing and Presenting RDF

SHAME is a library that leverages editors, presentations, and query interfaces for resource-centric RDF metadata. The central idea of SHAME is to work with *Annotation Profiles,* which encompasses:

- How the metadata in RDF should be read and modified
- What input is allowed, for example, multiplicity and vocabularies to use
- Presentational aspects like order, grouping, labels, and so forth

These annotation profiles are then used to generate user interfaces for either editing, presentation, or querying purposes. The user interface may be realized in a Web setting (both a jsp and velocity version exists) or in a stand-alone application (a java/swing version exists).

SHAME is open source and has been developed by the KMR group since 2003, see the Web page for more information and a demo: http://kmr.nada.kth.se/shame.

SCAM: A Framework for Metadata-Intense Applications

SCAM, Standardized Contextualized Access to Metadata, is a framework that provides a basis upon which different metadata-intense applications can be built. The design of SCAM is derived mainly from the demands of applications, such as archives and personal portfolios, and consists of two major parts:

- A **repository** for Semantic Web metadata expressed in RDF. Access to metadata is controlled on the level of records (i.e., metadata around a central resource) and collections of records that are called contexts. There is also search functionality, which can be restricted to specific contexts if so preferred.
- A **middleware** simplifying the development of Web-based applications. The middleware builds upon the WebWorks controller, Velocity template language, and provides solutions for metadata navigation, presentation, and editing.

A wide variety of applications have been developed on top of SCAM ranging from personal digital portfolios to a search and browsable media library for TV programs.

SCAM is open source and developed as a joint effort where the KMR-group stands for the scientific and technical coordination. See the homepage for more details: http://scam.sourceforge.net/

Confolio: An Electronic Portfolio System

A Confolio system contains a number of electronic portfolios, where each portfolio functions as a personal information archive. Such an archive can contain:

- *Digital material*, such as documents, films, pictures, slides, and so forth
- *Information* and *opinions* about this *digital* material
- *Information* and *opinions* about *nondigital* material, such as persons, books, concepts, events, and so forth

The access to material, information, and/or opinions can be restricted to individuals and groups, which makes it easy to create protected areas for collaboration and knowledge sharing. Searching for material can either be performed over an individual portfolio or over an entire confolio system. Moreover, each confolio system can be plugged into a distributed (peer-to-peer) network, which enables search and exchange for information and opinions within a global publication network.

The Confolio system is developed on top of SCAM and SHAME, two frameworks for metadata management on the Semantic Web. These frameworks, and hence also Confolio, have focused on interoperability and standards from the start, in order to avoid "leaving the users behind" as technology evolves and new functionality is to be integrated into the work environment.

The Confolio system is open source and developed as a joint effort where the KMR-group stands for the scientific and technical coordination. See the homepage for more details, http://www.confolio.org.