Preface

Part I presents two chapters that cover semantic enterprises. **Chapter 1** was written by the editors and presents their views on the future of the Semantic Web for enterprises. We begin by explaining the original idea of the Semantic Web and its main objectives. We also make clear what the importance of ontologies is. The reader will understand why the world requires new approaches for information systems development. While Semantic Web technologies can be used in various domains, we have decided to focus on their usefulness for enterprises. In this context, we explain and express the emergent need for a new kind of systems, ontology management systems. Finally, we enumerate the contributions of this manuscript. **Chapter 2** provides an overview of some of the business and technology challenges that companies are facing today, and describes how a number of these difficulties could be overcome with the use of Semantic Web technology. In order for Semantic Web technologies to be adopted within an enterprise setting, there must be mature tools that support the scalability, availability, and reliability requirements of such companies. To assess this, the chapter summarizes the state of the art in software tools and technologies, including both open-source and commercial products.

Part II is also composed of two chapters and describes the use of Semantic Web technologies in the financial domain and for municipal services. **Chapter 3** recognizes that data, information and knowledge management are key activities for finance. The volume, complexity and value of economic and financial information make finance a strategic area for research and innovation on information modeling, exchange and integration and, consequently, there is an increasing interest in evaluating what semantic technologies can contribute to this domain. **Chapter 4** describes an intelligent search engine for online access to municipal

services. Currently, most public administrations provide citizens with online access to their services. In fact, as of 2006, Spanish citizens have the possibility to perform 80 % of the city government services from their homes. However, there is still a big gap between the language used by public administrations and the way citizens refer to these services, which makes it difficult to match citizen requests. The use of semantic technology in this scenario allows bridging this gap.

Part III illustrates two domains that have adopted with a significant success Semantic Web technologies: Healthcare and Life Sciences. **Chapter 5** presents an application of ontology-based data integration for biomedical research. In this chapter, the authors explore the area of translational medicine that aims to improve communication between the basic and clinical sciences so that more diagnostic and therapeutic insights may be derived. Translation research goes from bench to bedside, where the effectiveness of results from preclinical research are explored with patients, and from bedside to bench, where information obtained from patients can be used to refine our understanding of the biological principles underpinning the heterogeneity of human disease and polymorphism(s). **Chapter 6** focuses on active semantic electronic medical records. The healthcare industry is rapidly advancing towards the widespread use of electronic medical records systems to manage the increasingly large amount of patient data and reduce medical errors. In addition to patient data there is a large amount of data describing procedures, treatments, diagnoses, drugs, insurance plans, coverage, formularies and the relationships between these data sets. Active Semantic Electronic Medical Record (ASEMR) application discussed here uses Semantic Web technologies to reduce medical errors, improve physician efficiency with accurate completion of patient charts, improve patient safety and satisfaction in medical practice, and improve billing due to more accurate coding. This results in practice efficiency and growth by enabling physicians to see more patients with improved care.

Part IV illustrates the use of Semantic Web technologies in education. **Chapter 7** presents a Semantic Web-based approach for targeting learning resources in competency-based organizations. This chapter addresses a concrete case study in which competencies inside an aeronautical organization have been modelled through ontologies, and Semantic Web technologies have used to devise the technical solution for delivering the competency gap analysis facilities and the subsequent match of the appropriate learning resources. This case study may serve as a reference for other organizations that aim at using the competency paradigm for the planning of organizational learning. **Chapter 8** explains how to develop a Course Management System (CMS) using Semantic Web technologies. While semantic Web technologies have reached a certain level of maturity,

the industry is still skeptical about its potential and applicability. Many vendors seem to be adopting a "wait-and-see" approach while emerging standards and solutions become more fully developed. The industry and its main players are waiting to see how real-world applications can benefit from the use of semantic Web technologies. The success of the Semantic Web vision is dependant on the development of practical and useful semantic Web-based applications. To demonstrate the applicability and the benefits of using semantic Web technologies, the authors have developed a real-world application, a semantic CMS (S-CMS), entirely based on the semantic Web that uses the latest technologies of this field such as OWL, RQL, RDQL, SPARQL, and SWRL.

Part V targets business and customer management. **Chapter 9** presents a case study on the integration of customer information using Semantic Web technologies. For the integration of data that resides in autonomous data sources Software AG uses ontologies. While data sources themselves normally represent more or less static data structures, the semantics of these data structures and their usage resides in application programs. However, it is essential to understand and model the semantics of these data sources when trying to integrate the data coming from disparate data sources. To bridge the gap between the pure structure information in single sources and the needed semantically enriched description of an integrated view we use semantic technology in terms of ontologies. **Chapter 10** explains how to support business process management with Semantic Web technologies. The authors show how existing Semantic Web service composition approaches can be applied to automate the design of Collaborative Business Processes (CBP). Furthermore, the authors show how message mappings between different message formats can be (semi-)automatically created based on a domain ontology. Although modeling efforts have to be invested, it is argued that semantic technologies are very helpful to counter current drawbacks. On the one hand, they allow saving efforts for the design of collaborative business processes and, on the other hand, the semi-automatic creation of mappings significantly reduces the required development efforts.

Part VI covers enterprise management and security. **Chapter 11** describes an ontology-based knowledge management system developed for the steel industry. Big companies have to face both internal and external challenges in order to deal with complex logistics, business processes and human resources management. The Semantic Web technology appears as a suitable candidate to address these problems and to provide innovative solutions in an open environment of decentralized resources. In this context, this chapter presents the experiences of Arcelor Mittal, the leader steel making company. In particular, the advantages of ontologies as knowledge representation artifacts are identified, driven by a handful of use cases within

the company, such as knowledge capitalization tools, an unified data description layer and supply chain management. **Chapter 12** explains how to bring semantic security to Semantic Web services. Semantic Web services begin to emerge as the next evolution of the Service Oriented Architecture. It has become clear that authorization is going to be one of the biggest challenges. A step toward resolving this problem is Semantic Authorization which provides an efficient means for a client to discover whether it may have permissions to access resources available through Semantic Web services.

http://www.springer.com/978-0-387-48530-0

The Semantic Web
Real-World Applications from Industry
Cardoso, J.; Hepp, M.; Lytras, M.D. (Eds.)
2008, XX, 308 p. 60 illus., Hardcover
ISBN: 978-0-387-48530-0