We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

3,500
Open access books available

108,000
International authors and editors

1.7 M
Downloads

Our authors are among the

151
Countries delivered to

TOP 1%
most cited scientists

12.2%
Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com



6

The Semantic Web-Based Collaborative Knowledge Management

Lemen Chao[1,2], Yong Zhang[2] and Chunxiao Xing[2]
[1]*Beijing Institute of Petrol-Chemical Technology, Beijing*
[2]*Research Institute of Information Technology, Tsinghua University, Beijing*
P. R. China

1. Introduction

The current knowledge processing models can be classified into two categories—Man's Knowledge Processing Model and Machine's Knowledge Processing Model—according to literature reviews of knowledge processing studies in knowledge management and Artificial Intelligence. Man's Knowledge Processing Model is based on knowledge management theory, especially the Second Generation Knowledge Management (SGKM), and focuses on processing tacit knowledge by human brains. Machine's Knowledge Processing Model is based on Artificial Intelligence or First Generation Knowledge Management (FGKM), and engages in processing explicit knowledge by computers. Furthermore, there are two challenges faced by current research of knowledge processing. One of these challenges is how to break through bottlenecks in the two knowledge processing model by lowering the cost of knowledge sharing and innovation and adopting machine-readable knowledge reorientation technology; the other one is how to make full use the complementary advantages of human and computer through combining the two models [1].

In this chapter, we carry out in-depth study of knowledge life cycle on the semantic web and propose the model for collaborative knowledge processing and its implementation framework. The remainder of this paper is organized as follows. In Section 2, we review the development of semantic web technologies and discuss machine readability of semantic web knowledge representation. In the next part, section 3, we describe the knowledge life cycle on the semantic web. Then, section 4 proposes a model for collaborative knowledge management on the semantic web and section 5 discusses how to implement the model. Section 6 provides a case study by analyzing the FOAF project. In the conclusion (section 7) some topics that should be further studied are proposed.

2. Related work

The term "Semantic Web" was coined by Tim Berners-Lee in 1998 and defined as not a separate Web but an extension of the current one, in which information is given well-defined meaning, better enabling computers and people to work in cooperation [2]. The layer cake framework of the semantic web implicates that the development of Semantic Web technologies proceeds in steps and each step building a layer on the top of another. It

mainly includes seven different layers, namely Unicode and namespace, XML, RDF(S), ontology, logic, proof and trust. Two principles, those are downward compatibility and upward partial understanding, were usually recommended to build adjacent layers [3].
There has been noticeable improvement in the studies of semantic web technologies over the past ten years. Some of them, especially the technologies at lower levels of the layered cake, such as XML, RDF(S), OWL and SPARQL, have been standardized by W3C knowledge representation, knowledge searching, knowledge mining, semantic web services, semantic grid, application integration and social network analysis are becoming research hotspots in knowledge processing. Project10X examined over more than 270 companies providing semantic products and services and published a semantic web wave report[4].The ReadWriteWeb picked out top ten semantic web products of 2009[5], including Google Search Options , Rich Snippets, Open Calais 4.0,BBC's Semantic Music Project, Freebase, and Data.gov.
It is one of revolutionary innovations in the semantic web that human-centric knowledge representation, which has been widely used in traditional web, is substituted for machine-centric knowledge representation. Therefore, knowledge on the semantic web is machine-readable. Machine readability of semantic web knowledge representation is implemented by:

2.1 Knowledge atom

The semantic web makes it possible to process knowledge by a smallest atomic unit of it. There are two knowledge representation technologies are commonly used on the semantic web, one is XML-based RDF(S) and the other is OWL Language. However, the core ideas behind them are similar: describing a knowledge atom as an object-attribute-vale triple and converting non atomic knowledge representation units into knowledge atoms by Reification Mechanism. Take a knowledge atom that represents 20100808's name is Zhang as example, its XML based RDF syntax knowledge representation is the following:

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:owl=http://www.w3.org/2002/07/owl#
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
xmlns:my="http://www.chaolemen.com/ University#" >
<rdf:Description rdf:about="20100808">
   <my:name>Zhang</my:name>
</rdf:Description>
</rdf:RDF>
```

2.2 Machine readability of knowledge atom

The meaning of knowledge atom is declared in domain ontology which is written by XML-based RDF schema or OWL language. Therefore, the semantic web allocates a unique specific meaning to each of knowledge atoms in a semantic web document and can avoid the two well-known semantic problems: homonymy and polysemy. Take knowledge atom 20100808 as example, the meaning that 20100808 represents a student could be described as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:owl="http://www.w3.org/2002/07/owl#"
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
 xmlns:my="http://www.chaolemen.com/University#" >
<rdf:Description rdf:about="20100808">
   <rdf:type rdf:resource= "&my;Stuedent"/>
   <my:name>Zhang</my:name>
</rdf:Description>
 </rdf:RDF>
```

2.3 Machine readability of relation between knowledge atoms

The machine readability of knowledge atom is a necessary condition for that of web knowledge and not the sufficient condition of it. There is another necessary condition which is machine readability of relations between knowledge atoms. Semantic web makes it possible to represent the knowledge relations in machine readable syntax. For example, a knowledge atom 20101881 is the teacher of another knowledge atom 20100808, the machine readable relation between them can be shown as follows in XML-based RDF(S) syntax.

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:owl="http://www.w3.org/2002/07/owl#"
 xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
 xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
    xmlns:my="http://www.chaolemen.com/University#" >
<rdf:Description rdf:about="20101881">
    <rdf:type rdf:resource= "&my;Teacher"/>
    <my:name>Wang</my:name>
    <my:isSupervisorOf rdf:resource="20100808"/>
</rdf:Description>
  </rdf:RDF>
```

3. Knowledge Life Cycle on the semantic web

Knowledge Life Cycle (KLC) is one of the most important concepts in New Generation Knowledge Management (NGKM). The NGKM for the first time allows for the production of new knowledge in knowledge management, while the First Generation Knowledge Management concerns itself mainly with the distribution, sharing and use of existing knowledge. Existing knowledge can be categorized into knowledge in human brain and knowledge stored on the Web. In this paper, the topic is just limited to the existing knowledge, namely knowledge stored on the Web.

The production of new knowledge form existing knowledge mainly relies on the technologies of Artificial Intelligence (AI) to date. However, the AI hasn't made much progress with knowledge production yet.

Semantic Web is not a separate Web but an extension of the current one, in which information is given well-defined meaning, better enabling computers and people to work in cooperation[6]. Semantic web having well structured data provides a new solution for producing new knowledge based on existing knowledge.

3.1 KLC in next generation knowledge management

KLC shown as Figure 1 was developed by members at the Knowledge Management Consortium International (KMCI), especially by Joseph M. Firestone and Mark W. McElroy[7]. In that Figure, the life cycle of knowledge is a continuum regime of knowledge process and it can be divided into three fundamental phases: knowledge production, knowledge validation and knowledge integration.

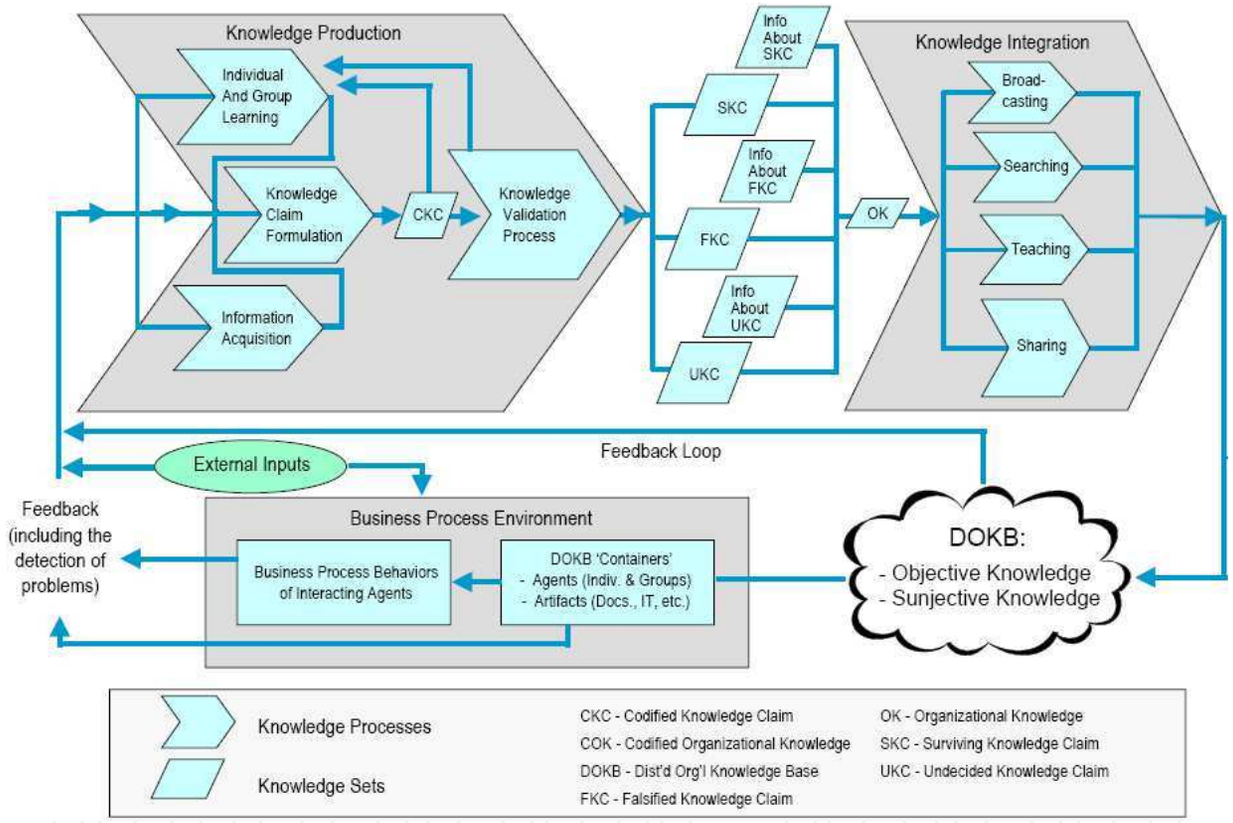


Fig. 1. KLC in NGKM (Source: Mark W. McElroy, The new knowledge management: Complexity, learning, and sustainable innovation, KMCI Press, USA, 2002.)

The theoretical foundation of KLC is Complex Adaptive System Theory (CAS theory). This theory views a system as a fluidly changing collection of distributed interacting components that react to both their environments and to one another. Therefore, CAS theory makes KLC possible to study organizational knowledge management from a new perspective, in which the complexity of managing knowledge comes from not only the external environment, but also the internal adaptive components.

The most significant contribution of KLC to knowledge management is for the first time arguing that the knowledge process is one kind of natural process of living systems. The first generation knowledge management theory places too much emphasis on supply side of knowledge process (such as the sharing and use of existing knowledge), while neglecting

the importance of demand side knowledge process (including the production, validation and integration of knowledge).The introduction of KLC changes the conventional ways of thinking on knowledge management into a more effective way — Next Generation Knowledge Management (NGKM).

3.2 KLC on the semantic web

Semantic Web makes it possible for AI to manage the knowledge on the web effectively. Semantic Web is an evolving extension of the World Wide Web in which the semantics of information and services on the web is defined, making it possible for the web to understand and satisfy the requests of people and machines to use the web content [2]. Therefore, this new technology will definitely introduce a new research domain into current knowledge management theory.

Contrary to knowledge in human organizations, the knowledge on semantic web is created, processed, stored, and transferred by machine agents, not directly by human brain. Semantic knowledge management turns much attention to sharing and reusing the knowledge while organizational knowledge management places more emphasis on the continuous production of new knowledge through enhancing the conditions in which innovation and creativity naturally occur and organizational learning happen. In other words, Knowledge management on semantic web belongs to supply side knowledge management while organizational knowledge management belongs to demand side knowledge management. Currently, KLC is limited to life cycle of knowledge in human organizations, not considering the knowledge management on semantic web.

The different stages in semantic KLC are representation, interconnection, reasoning, retrieving, validation and integration (Figure 2).

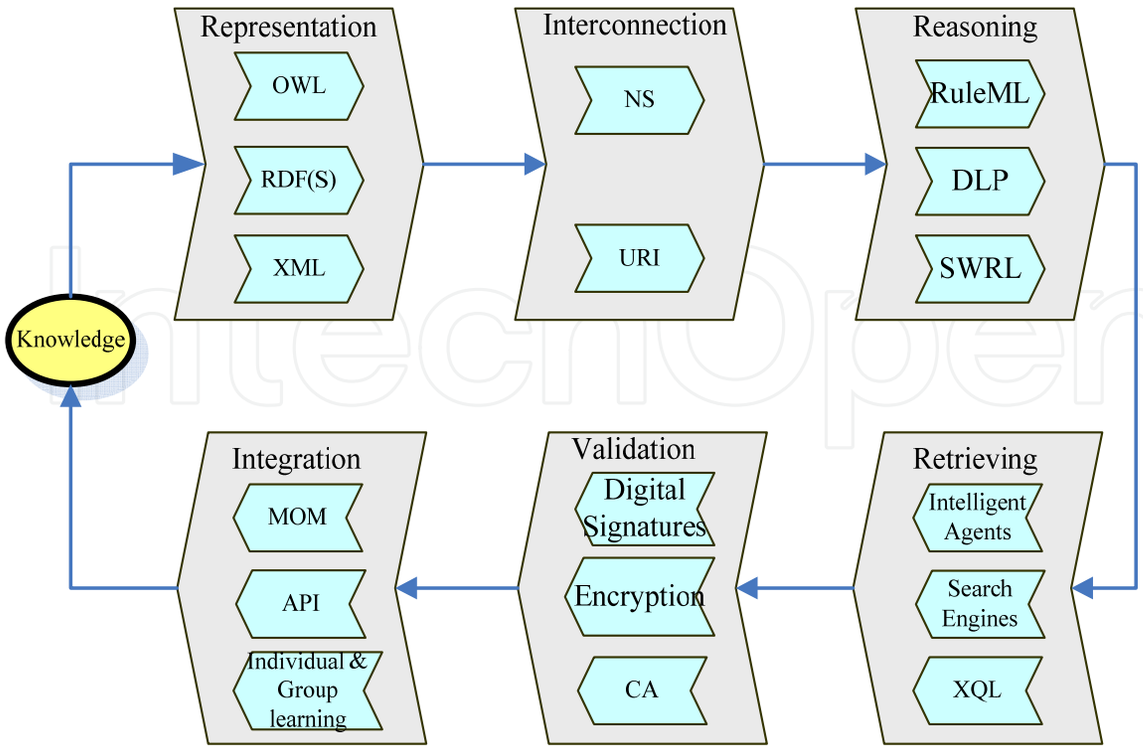


Fig. 2. KLC on the Semantic Web

(1)Knowledge representation: The main purpose of knowledge representing is changed on semantic web. Traditionally, web content is formatted for human readers rather than computer applications. As a result, the machines hardly find, organize, integrate or validate knowledge on the traditional web without man's intervention. We have been tended to believe that Artificial Intelligence is the only way to manage the web data by machines or applications. AI hasn't been, however, made much progress with data management yet and therefore many scholars of knowledge management have to grant a higher value on human-centric knowledge management instead of machine- centric knowledge management. Semantic web, for the first time, make it easier for machines to manage web knowledge because data are represented to be machine readable. The main semantic technologies to represent data semantically are Unicode, XML (Extensive markup language), RDF/RDFs (Resources Description Framework / Resources Description Framework Schema), and OWL (Web Ontology Language) [8].

(2)Knowledge interconnection: Another main purpose of semantic web is to build a web between data. Today's web is not a web of data, but a web of computers or applications. Knowledge on the current web doesn't connect with or be related to each other. Uniform(URI) and Namespace (NS) are most common used technologies to build connection between semantic knowledge.

(3)Knowledge reasoning: Semantic web's strength lies in its ability to knowledge reasoning. It is very difficult for today's web to reason knowledge because of lacking metadata and rules. Semantic web makes knowledge reasoning possible by adding semantic metadata and a rule system to semantic data. By adding new rule system to the semantic web, new knowledge can be inferred and existing knowledge can be validated. Rule system may be Monotonic or Nonmonotonic. Monotonic rule system, which is a special care of predicate logic, can be combined with semantic web by Semantic Web Rules Language (SWRL) or Description Logic Programs (DLP). No monotonic rules are useful in situations where the available information is incomplete [9]. Through RuleML, Nonmontonic rules can be represented easily and priorities to resolve some conflicts between these rules can also be added.

(4)Knowledge retrieving: Knowledge can be retrieved with high precision on semantic web. The process of semantic knowledge searching can be divided into following steps: searching for semantic web document and searching for semantic knowledge in a web document found. Intelligent agent and search engines are the most frequently used tools to search for semantic web documents. After the document is located, addressing and querying languages, such as XQL, XQuery, X-Path, RQL and SPARQL, can be used to further search for semantic web parts.

(5)Knowledge validation: As knowledge on semantic web may be redundant, out-of-date, incorrect, or distorted, it is necessary for semantic web to validate the result set of knowledge retrieving. Knowledge validation in NGKM refers to the process by which new "knowledge claims" are subjected to peer review and a test of value in practice [10]. The process of validating semantic knowledge can be carried out based on its authenticity and integrity. Digital signatures, encryption, certificate authority technology are the most prevalent technologies for semantic web to validate its knowledge.

(6)Knowledge integration: Diverse knowledge which has been validated sometimes needs to be integrated with each other. There are three kinds of knowledge integration technologies:

- Technologies to integrate knowledge with each other, such as Message-oriented Middleware (MOM), Message Broker or Adapters.

- Application programming interface (API) to integrate knowledge with applications, such as ADO.NET, ODBC, and JDBC.
- Technologies to integrate knowledge with business process including Individual and Group Learning.

Though knowledge management on semantic web is only in the initial phase, it looks quite promising. That knowledge life cycle on semantic has three features: 1) the life cycles of knowledge on semantic web is a continuums regime of knowledge process, 2) six distinct stages in semantic knowledge management are representation, interconnection, reasoning, retrieving , validation and integration, and 3) semantic knowledge management requires different methodologies or technologies for different stages.[11]

4. Modelling collabrative knowledge management on the semantic web

4.1 Web2.0 and its implications

The concept of "Web 2.0" began with a conference brainstorming session between O'Reilly and MediaLive International [12]. Web 2.0 is not a new technology, but a new shift in the application model of the World Wide Web. Design principles behind web 2.0 include: The web as platform, harnessing collective intelligence, data is the next Intel inside, end of the software release cycle, lightweight programming models, software above the level of a single device and rich user experience [13].There are some typical applications of web 2.0 such as Blog,RSS,Wiki,Tag,SNS,P2P which has been widely used on existing web. The reasons why web2.0 has been successfully accepted are as follows: users create value, networks multiply effects, people build connections, companies capitalize competences, new recombines with old, and businesses incorporate strategies [14].

	Principles	*Lessons*
1	*The web as platform*	*Leveraging customer-self service and algorithmic data management to reach out to the long tail and not just the head.*
2	*harnessing collective intelligence*	*Network effects from user contributions are the key to market dominance in the Web 2.0 era.*
3	*data is the next Intel inside*	*Database management is a core competency of Web 2.0 companies*
4	*end of the software release cycle*	*Operations must become a core competency and users must be treated as co-developers*
5	*lightweight programming models*	*Support lightweight programming models that allow for loosely coupled systems；Think syndication, not coordination；Design for "hackability" and remixability*
6	*software above the level of a single device*	*The PC is no longer the only access device for internet applications, and applications that are limited to a single device are less valuable than those that are connected*
7	*rich user experience*	*Companies that succeed will create applications that learn from their users, using architecture of participation to build a commanding advantage not just in the software interface, but in the richness of the shared data.*

Table 1. Design principles behind web 2.0

In contrast to web1.0, web2.0 extends the coverage of knowledge management to the long tail of organizational knowledge chain so that it can nurture knowledge ecosystems for contemporary organizations. Some of the key implications of web2.0 on knowledge processing are as following:

(1)Mass-Collaborative Knowledge Processing: It can be easily inferred from some principles behind web2.0 such as harnessing wisdom of crowds, lightweight programming models, software above the level of a single device and rich user experience, that knowledge processing activities on web 2.0 environments are mass-collaborative. All volunteers who located on long tail of organizational knowledge chains would be encouraged to participate in organizational knowledge intervention and can save the cost of knowledge sharing and innovation in organizations.

(2)Self- Organized Knowledge Processing: Web2.0 applications allow users to cooperate with each other rather than controlled by other. Wiki, for example, allows anyone not only to contribute his or her own knowledge but also to edit the knowledge provided by others Therefore, a self-organized knowledge processing platform forms on web2.0 and facilitates ongoing knowledge sharing and innovation activities in organizational knowledge ecosystems.

(3)Meta-synthestive Knowledge Processing: The three main elements of knowledge processing system -content, machine and man- can be integrated seamlessly in web2.0 environments. The increasing popularity of Internet technology highlights limitations of human brain in the speed, accuracy, strength, storage capacity, storage time and standardization of knowledge processing. As a result, computer is becoming an alternative tool of knowledge processing. The abilities of human brain and computers in knowledge processing are complementary with each other so that man-machine collaborative knowledge processing will be one of the basic models for computing knowledge on the web.

4.2 Integrating semantic web with web2.0

Table 1 conducts a comparison between the semantic web and web2.0 from a knowledge processing perspective. There is a growing awareness that integrating semantic web with web2.0 is reasonable and practical [15] .Web3.0, which is the third wave to hit the web in future, should be an integration of semantic web into web2.0 [16]. The semantic web and web2.0 are complementary with each other [17], for example the semantic web can be used for linking and reusing data across Web 2.0 communities [18].

		Web 2.0	The Semantic Web
Similarities	*Platform*	*Internet, especially world wide web*	
	Purpose	*To Improve the efficiency of Knowledge Processing*	
Differences	*Level*	*Applications*	*Data*
	Unit	*Micro contents*	*Knowledge atom*
	focus	*Man*	*Machine*

Table 2. A comparation between the semantic web and web2.0

According to the seven basic principles of Web2.0 and main outcomes of organizational knowledge management, we can propose a novel collaborative knowledge management model by the holistic systems approach. The model has three different layers: knowledge chain management, knowledge base management and knowledge ecosystem management,

as shown in Figure 3. These three levels correspond to the three different objectives of organization knowledge management respectively: accumulating or creating organizational knowledge, mining or utilizing organizational knowledge and building a knowledge ecosystem for the organization. The theoretical foundation of knowledge chain management is Web2.0 based organizational knowledge management. Knowledge chain management plays a role of knowledge provider for organizational knowledge base. The management of knowledge base in turn could promote the further development of the knowledge chain management. Knowledge base management is a prerequisite for building a knowledge ecosystem and a well developed knowledge ecosystem can provide a better environment for construction of knowledge base. Organizational knowledge management should cultivate its knowledge chain, knowledge base and knowledge ecosystem at the same time.

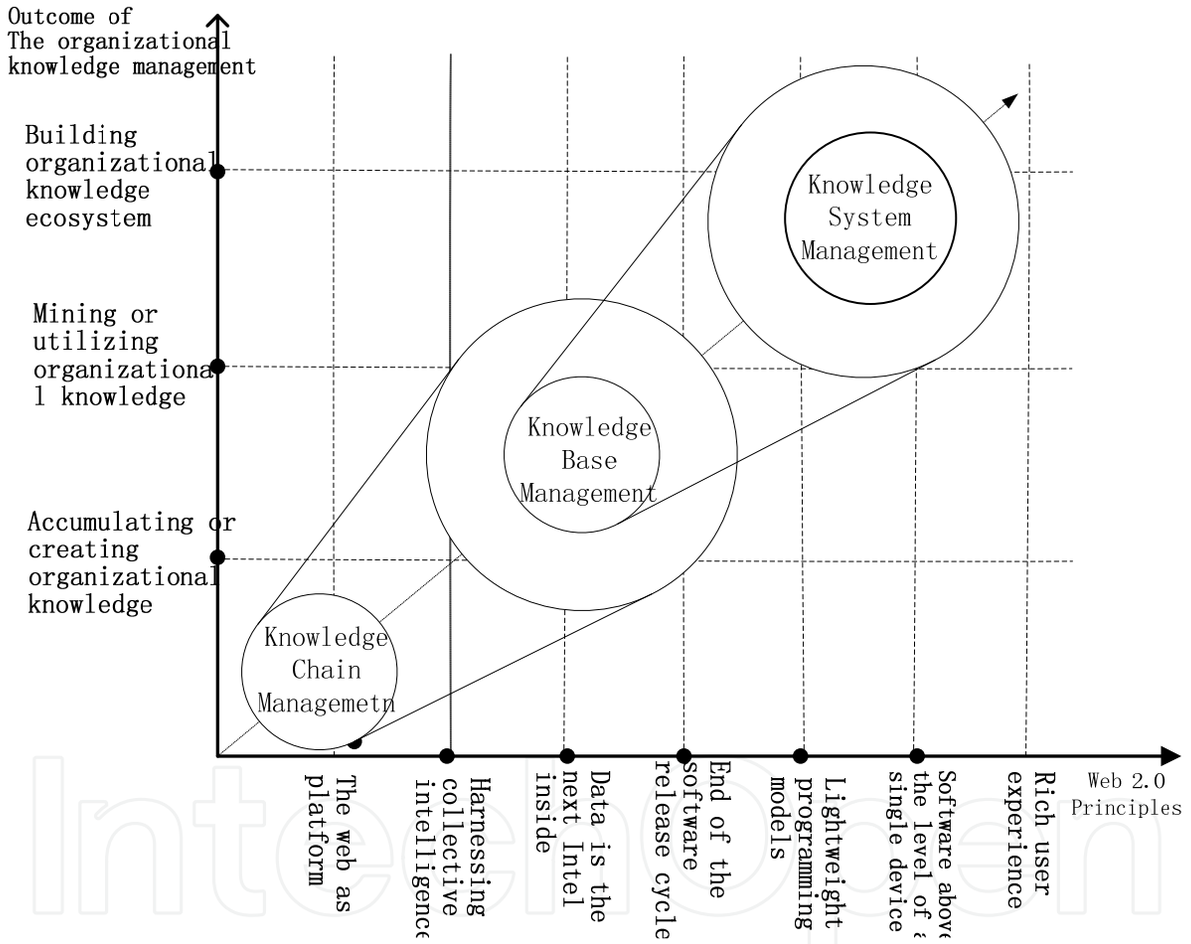


Fig. 3. A Model for Collaborative Knowledge Management on the Semantic Web

5. Implementing collaborative knowledge management on the semantic web

Figure 4 introduces a new framework that integrates semantic web with web2.0 to make full use the mutually complementary natures of them. The framework consists of following five layers in top-down direction: user layer, application layer, computing layer, knowledge layer and networking layer. The building activities of the five different layers should also follow the two basic principles of semantic web layered cake -downward compatibility and upward partial understanding- has been discussed in previous section.

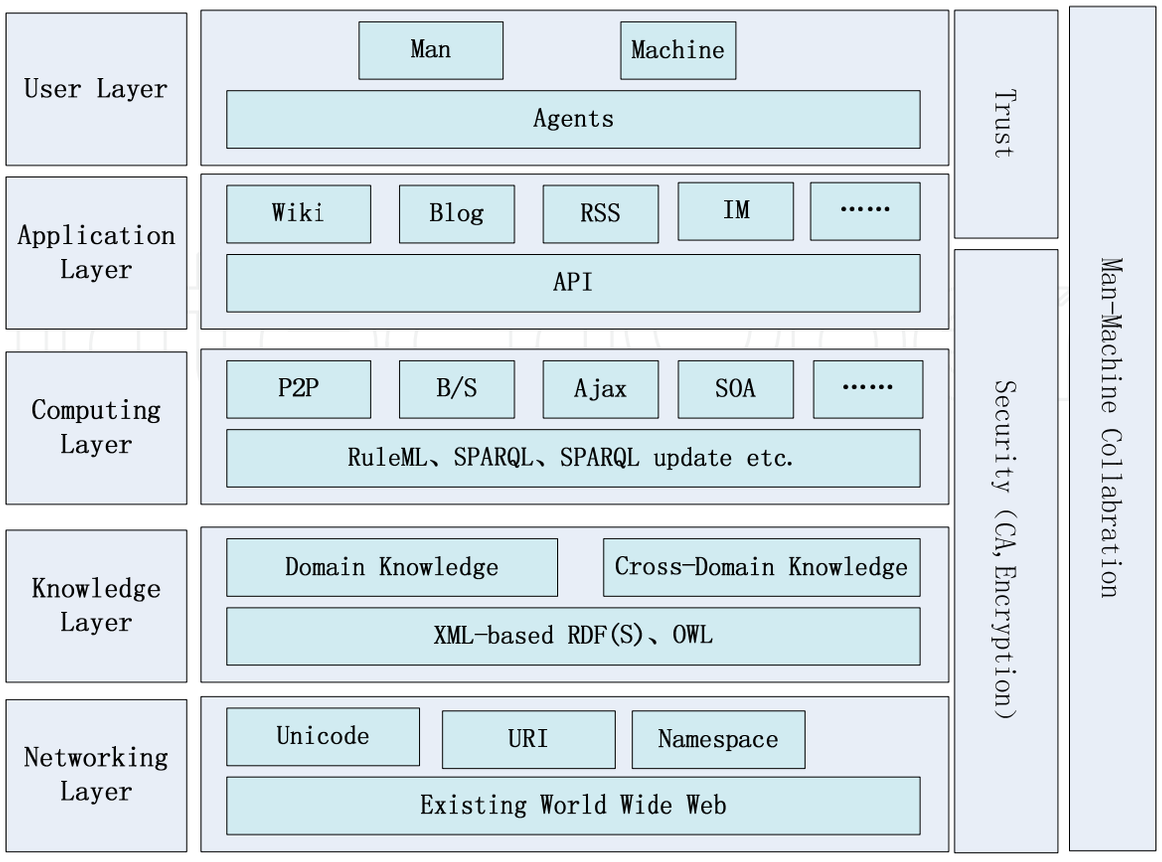


Fig. 4. Knowledge Processing Framework for Integrationg Semantic Web with Web2.0

5.1 Networking layer

The new framework is built on the top of traditional World Wide Web technologies and provides the knowledge layer with the services of data interconnecting and transferring. Some current web technologies, including Unicode, URI and namespaces, form part of the basic structure of this layer.

5.2 Knowledge layer

The knowledge layer is located between the networking layer and computing layer and provides the upper layer with machine readable knowledge representation services. This layer involves two kinds of knowledge: domain knowledge and non-domain knowledge. The latter can be described, retrieved, inferred and validated by the former. Unlike domain knowledge, non-domain knowledge can be maintained by collaborative efforts of domain experts and grass root users. XML-based RDF and OWL language is two most prevailing technologies in the knowledge layer.

5.3 Computing layer

The computing layer bridges the gap between the computing layer and the application layer and be responsible for knowledge retrieving, inferring, extracting and mining of the whole framework. Therefore, its knowledge processing technology depends on the two other layers. Some semantic web knowledge processing technologies, including RuleML,SPARQL and SPARQL-update , are used for knowledge computing in the computing layer because of

its lower layer and some web2.0 technologies, such as P2P,B/S,Ajax and SOA , are also used to keep align with its upper layer.

5.4 Application layer

The application layer is the upper layer of the computing layer and provides the user layer with web2.0 application environments, such as Wiki, Blog, RSS and IM. The layer combines web2.0 with semantic web so that improves the effects of knowledge processing by man-machine collaboration. At the same time, the technologies of Application Programming Interface are usually required in this layer for keeping its independence with computing layer.

5.5 User layer

At the top of the framework, we can find user layer including agents, men and machines. Men and machines can use web2.0 application of application layer by intelligent agents. Men, machines and agents at the long tail of organizational knowledge chain are encourage to take part in knowledge processing activities in order to build organizational knowledge ecosystems which support mass-collaborative, self-organized, and Meta-synthesized Knowledge Processing.

5.6 Trust and security

Shown as figure 1, it is evident that trust and security are common challenge for all the layers and can't be ignored by any of the layers. Therefore, a holistic security and trust solution is required in the framework. In general, the trust of two top layers- user layer and application layer - could be implemented by interaction between agents, at the same time, the security of the other three layers should use information security technologies, including encryption or certificate authentication.

5.7 Man-machine collaboration

Man-machine collaborative knowledge processing is one of most protruding features in the framework which inherits from web2.0. It should be put on top of the list to maximize the complementary advantages of man and machine when developing or selecting methods and technologies for each layer.

6. Case study

In this section, we're going to make an in-depth study of applications built on the top of FOAF project and to provide insights into the semantic web based collaborative knowledge management.

The Friend of a Friend (FOAF) is a project about creating a web of machine-readable homepages describing people, the links between them and the things they create and do[19]. The project accumulates various kinds of data, such as text, photo and records, from real practices and defines relations between different data source by social relations[20][21][22].Knowledge life cycle of a typical FOAF application is as follows:

(1) Knowledge representation. Users of these applications can publish their personnel information in FOAF language , an XML-based RDF knowledge representation language introduced by the FOAF project. The language employs classes FOAF:Agent,

FOAF:Document, FOAF:Group, FOAF:Image, FOAF:OnlineAccount, FOAF:Orgnization, FOAF:Person, FOAF:PersonalProfileDocument, FOAF:Project to represent an agent, document, group, image, account, organization, person, personal profile information or project respectively. Currently, although some tools are developed to capture FOAF information automatically from the web, the reliability of those tools is not enough to be completed the task by computers itself. The machine's knowledge presentation is in need of man's intervention. As a result, knowledge representation in FOAF project should be conducted by the collaboration of men and machines.

(2) Knowledge interconnection: The FOAF language defines tags FOAF:knows, FOAF:made, FOAF:maker, FOAF:fundBy, FOAF:member, FOAF:member, FOAF:currentProjects, FOAF:pastProjects, FOAF:SchoolHomepag to represent relationships between friends, resource and its makers, resource and its funders, organization and its members ,a project and its relevant projects, persons and schools. Therefore, applications on the top of FOAF can build a machine readable web of knowledge elements.

(3) Knowledge reasoning: Applications built on the top of FOAF can conduct social network analysis and compute the size or density of a collaborative network, degree of or distances between actors, length of a collaborative walk, diameter and radius of a collaborative network, reachability between enablers, and centrality of an agent.

(4) Knowledge retrieving: Queries of knowledge retrieving in these applications can be written in the SPARQL language, a query language for RDF recommended by W3C.As SPARQL has a good support for expressing queries across diverse data sources, applications built on the FOAF can provide cross domain data sharing and on-demand knowledge services.

(5) Knowledge validation: FOAF applications can validate the results sets of retrieving activities by integration the semantic web with web2.0. The knowledge represented by semantic web technologies has good support for machine readability and be convenient to validate automatically. However, machines are not always competent at automatic knowledge validation and in need of human intervention. Pro-Ams (Profession Amateurs) from the long tails of web2.0 applications have good domain knowledge and can be used to make up for deficiencies in knowledge validation by computers.

(6) Knowledge integration: the Knowledge validation could be followed by integration of knowledge from different sources. A semantic web-based collaborative knowledge processing system built on FOAF project has a good capability for integrating personal information with tacit knowledge, explicit knowledge or application by integration the semantic web technologies with web2.0 principles.

While FOAF is a simple application of the Semantic Web, it has been widely used in social network analysis[23], search engine[24], e-commerce partner query [25].The success of FOAF application not only stress the necessity for studying human-machine collaborative knowledge management, but also highlights the importance of human intervention in knowledge processing by computers.

7. Conclusions

The increasing popularity of Internet technology highlights limitations of human brain in the speed, accuracy, strength, storage capacity, storage time and standardization of knowledge processing. As a result, computer is becoming an alternative tool of knowledge processing. However, the human-oriented knowledge representation, which is a common feature of traditional knowledge representation technologies, makes the machines'

knowledge processing activities complex. The Semantic Web provides a new platform for Man-Machine cooperative knowledge processing because of its computer-readable knowledge representation technologies. Therefore, Man-Machine cooperative knowledge processing is becoming one of the hot research topics in knowledge management.
This chapter discussed new features of the Semantic Web-based knowledge processing, designed a model to combine the Semantic Web with Web2.0 for knowledge processing and proposed a unified framework of organizational knowledge ecosystems and knowledge processing software systems, after in-depth studies on the Semantic Web, Web 2.0 and Knowledge Ecology. Research methods such as literature review, case study, system study, and knowledge engineering methodologies are used to conduct the research.

8. Acknowledgments

This research was supported by Natural Science Foundation of China (No. 71103020), Key Laboratory of Data Engineering and Knowledge Engineering (Renmin University of China), Ministry of Education (No. KF2011001), Funding Project for Academic Human Resources Development in Institutions of Higher Learning Under the Jurisdiction of Beijing Municipality(No. PHR201108368), and National Basic Research Program of China (973 Program, No.2011CB302302).

9. References

[1] Chao Lemen. The New Knowledge Processing:Integrating Semantic Web with Web 2.0[C].2010 International Conference on Computer Application and System Modeling.
[2] Tim Berners-Lee, James Hendler, Ora Lassila.The Semantic Web[J].Scientific American, 2001(5):34-43.
[3] Grigoris Antoniou, Frank van Harmelen. A Semantic Web Primer (Second Edition) [M]. The MIT Press, 2008:17-18.
[4] Project10X. Semantic Wave 2008 Report: Industry Roadmap to Web 3.0 and Multibillion Dollar Market Opportunities[R/OL]. (2008-9) [2011-3-19]. http://www.project10x.com/.
[5] Richard MacManus. Top 10 Semantic Web Products of 2009[OL]. (2009-12-20) [2009-12-19]. http://www.readwriteweb.com/archives/top_10_semantic_web_products_of_2009.php
[6] T.Berners-Lee, J. Hendler and O. Lassila. "The Semantic Web", Scientific American, Scientific American, Inc., 2001(5), pp. 34-43
[7] Mark W. McElroy, The new knowledge management: Complexity, learning, and sustainable innovation[M], KMCI Press, USA, 2002.
[8] Thomas B. Passin, Explorer's Guide To The Semantic Web, Manning Publications Co., USA, 2004.
[9] G. Antoniou, F. Van Harmelen, a Semantic Primer, The MIT Press, London, England, 2008.
[10] Mark W. McElroy, Second Generation KM a White Paper[J], EMERGENCE, Lawrence Erlbaum Associates, Inc., 2002(3), pp. 90–100

[11] Chao Lemen,An Xiaomi,Ye Liuqi,Knowledge Life Cycle on Semantic Web,Proceedings of 2009 International Forum on Information Technology and Applications[C],IEEE Computer Society,2009.
[12] Tim O'Reilly. What Is Web 2.0,Design Patterns and Business Models for the Next Generation of Software.(2005-9-30)[2011-07-11]. http://oreilly.com/web2/archive/what-is-web-20.html.
[13] Colin White. The Impact of Web 2.0[J].DM Review, 2007(8):14.
[14] Amy Shuen.Web 2.0: A Strategy Guide[M].O'Reilly Media, Inc.2008:1-266.
[15] James Hendler, Jennifer Golbeck. Metcalfe's law, Web 2.0, and the Semantic Web [J]: Journal of Web Semantics, 2008(6):14-20.
[16] Ora Lassila, James Hendler.Embracing Web 3.0 [J].IEEE Internet Computing,2007(3):90-93.
[17] Anupriya Ankolekar, Markus Krotzsch, Thanh Tran, Denny Vrandecic. The two cultures: Mashing up Web 2.0 and the Semantic Web [J].Journal of Web Semantics, 2008(6):70-75
[18] U. Bojars, J.G. Breslin, A. Finn, S. Decker. Using the Semantic Web for linking and reusing data across Web 2.0 communities [J].Journal of Web Semantics, 2008(6): 21-28
[19] foaf-project.org. About FOAF [OL][2011-09-01]. http://www.foaf-project.org/about/
[20] Dan Brickley and Libby Miller. FOAF Vocabulary Specification 0.91 Namespace Document 2 November 2007 - OpenID Edition [EB/OL]. http://xmlns.com/foaf/spec/,2007.
[21] Edd Dumbill, XML Watch: Finding friends with XML and RDF[EB/OL] (2002-6-1) [2009-4-5]. http://www.ibm.com/developerworks/xml/library/x-foaf.html]
[22] The Friend of a Friend Project.RDFWeb: Friend of a Friend (FOAF)[OL].[2011-10-20]. http://rdfweb.org/foaf/
[23] Guillaume Erétéo, Michel Buffa, Fabien Gandon, Patrick Grohan, Mylène Leitzelman, Peter Sander.A State of the Art on Social Network Analysis and its Applications on a Semantic Web[C].In: Proc. SDoW2008 Social Data on the Web, Workshop held with the 7th International Semantic Web Conference Karlsruhe, Germany: (October 2008)
[24] Google.Social Graph API[OL].[2011-9-20]. http://code.google.com/intl/EN/apis/socialgraph/
[25] WANG Xu-ping,NI Zi-jian,HU Xiang-pei. A method of searching e-commerce partner based on FOAF and RDQL [J]. Journal of Harbin Institute of Technology, 2008(4):661-665.



New Research on Knowledge Management Technology

Edited by Dr. Huei Tse Hou

ISBN 978-953-51-0074-4
Hard cover, 228 pages
Publisher InTech
Published online 24, February, 2012
Published in print edition February, 2012

Due to the development of mobile and Web 2.0 technology, knowledge transfer, storage and retrieval have become much more rapid. In recent years, there have been more and more new and interesting findings in the research field of knowledge management. This book aims to introduce readers to the recent research topics, it is titled "New Research on Knowledge Management Technology" and includes 13 chapters. In this book, new KM technologies and systems are proposed, the applications and potential of all KM technologies are explored and discussed. It is expected that this book provides relevant information about new research trends in comprehensive and novel knowledge management studies, and that it serves as an important resource for researchers, teachers and students, and for the development of practices in the knowledge management field.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Lemen Chao, Yong Zhang and Chunxiao Xing (2012). The Semantic Web-Based Collaborative Knowledge Management, New Research on Knowledge Management Technology, Dr. Huei Tse Hou (Ed.), ISBN: 978-953-51-0074-4, InTech, Available from: http://www.intechopen.com/books/new-research-on-knowledge-management-technology/the-semantic-web-based-collaborative-knowledge-management

INTECH
open science | open minds

InTech Europe
University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China
Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821