E-exhibition towards International Trade base on Knowledge Management

ZHENG Lei-na, PAN Tie-Jun, FANG Lei-lei, YU Yun, HU Yue, BAO Hui-han
Department of Business School
ZheJiang WanLi University
NingBo 315100
China
http://www.zwu.edu.cn

Abstract: - In recent years, the total number of traditional exhibition in developed countries show a decline, exhibitors are dropped because more of them use network technology to carry out on-line international trade, display products and the exchange of information. E-exhibition is to flourish which provide low cost and all-day exhibition to international trade of Medium-Sized Enterprise (SME), but the current only human-readable web content hindered E-exhibition development, we propose a kind of E-exhibition solution based on Semantic Web making web content machine-readable so that international trade can be more easily analyzed by software agents and shared among Web Services which can represent explicitly the core competitiveness of SME. Then, a new knowledge management methodology for E-exhibition of SME which including product, process, technology, services and application domain sub ontology based on semantics web is given. Furthermore, we propose E-exhibition logical view using Semantic Web, select the consumer goods as the application domain, and set up an E-exhibition platform of SME. In the end, consumer goods ontology architecture is give and a case study is shown, which proved that semantics web provide at least the infrastructure to build reusable structures among communities of E-exhibition for SME.

Key-Words: - knowledge management, E-exhibition, international trade, Small and Medium-Sized Enterprise, semantic, ontology, web services
Supported by Ningbo Municipal Natural Science Foundation of China (2007A610041)

1 Introduction
With the advent of the new century, international trade entered the "global economy of the Internet Age." The new economy in the form of knowledge-based and information network supported is based on high-tech industries, its main content of network economy using IT and network technology. Internet has increasingly become the second space of people's lives, constitute an important information exchange platform for modern society. Networking technology is to infiltrate the economic and social life of mankind in all aspects which tremendous changes enterprises to carry out marketing and external communication. These have brought new opportunities and challenges to the exhibition industry. Exhibition industry has to keep pace with the trend, seize the opportunity, enhance industrial competitiveness and achieve sustainable development through the network of information technology. In recent years, the total number of traditional exhibition in some developed countries such as Germany show a decline, particularly in the IT industry. Exhibitors are dropped because more of them use network technology to carry out on-line display products, the exchange of information and business. E-exhibition is to flourish [1].

In China, international trade stand great part of economy and its exhibition has become one of great concerns of both government and enterprises, for exhibition capability stands for one of great symbols of core competitiveness of modern enterprises. According to the analysis from AMR organization, there are over 12 million of SME in China and less than 20% of them have somewhat information technologies is changing the economics of enterprise applications by making E-exhibition and international trade easier to acquire, implement, extend and change. It is very important to study how to make good use of E-exhibition to international trade.

The core competitiveness of SME is the professional product, technology, process and services in the special application domain which is simple than the big enterprise having mass complicating competitiveness. E-exhibition emerges and develops in the context of globalization manufacturing, which stresses the international trade and cooperation of core competencies of SME. From the perspective of information science, the core
competitiveness, such as product, technology, process and services, can be published and provided in the form of SME knowledge with digital and networked web services on the Internet. E-exhibition is the outcome of in the Internet times. However, the current Internet providing non-structured and semi-structured knowledge can not meet the advanced demands of machine-to-machine automatic search in the vast knowledge of E-exhibition. Users manually search product, services in person until the emergence of the semantic web.

2 Knowledge management

“Knowledge is a fluid mix of framed experience, values, contextual information, expert insight and grounded intuition.” [2] There is much discussion on whether one may actually manage knowledge since it is tied to one’s own experience and life. In this view, knowledge would be highly personal and impossible to express explicitly.

Without entering into this debate, we will consider that individuals can actually learn from each other and exchange knowledge. We will use a practical definition of knowledge management: “Knowledge Management enables the creation, communication, and application of knowledge of all kinds to achieve business goals”. [2] In this view, one differentiates tacit from explicit knowledge: Explicit knowledge is knowledge that has been captured and organized in a form that allows its distribution. In E-exhibition of SME, explicit knowledge could be an architectural model of a product, or a requirement specification. Tacit knowledge is particular to each individual and difficult to share as one is usually not even aware of all one knows. Externalization is the process to explicit what one knows. Through externalization, a knower may express (e.g., writing a manual) what he knows and this knowledge may then be circulated among a large group or across time. In E-exhibition of SME, a typical case would be the experience about the product, also may happen during a E-exhibition when one SME explains another some ideas. Combination is the process of combining various sources of explicit knowledge to create a new one, as one would do in a literature survey. We are looking for ways to help these activities happen in E-exhibition where knowledge of the products being shown to all world. Different techniques and tools been proposed to support these activities of knowledge management. In this paper we will study knowledge organization: ontology.

Ontology is an explicit specification of a simplified, abstract, view of some domain that we want to describe, discuss, and study. The primary goal of ontology is to represent explicit knowledge, it is typically the result of a combination effort where one gathers various authoritative sources on the domain and creates a consensus. There are different types of ontology [3]; we use domain ontology to describe the domain of innovation design. Domain ontology should contain a description of the domain and their properties, relationships, and constraints.

Often, ontology may serve various purposes:

- Reference on a domain: Explicit knowledge serves as a reference to which people looking for detailed information on the domain modeled.
- Classification framework: The concepts explicated in ontology are a good way to categorize information on the domain modeled. Indication of synonyms in the ontology helps avoiding duplicate classification. Other relations among the concepts of the ontology help one browsing it and finding information one is looking for.
- Interlingua: Tools and/or experts wishing to share information on the domain modeled, may use the ontology as a common base to resolve differing terminologies.

3 E-exhibition ontology

We defined ontology of the knowledge used in E-exhibition to serve as a structuring framework for our research. We will not enter in a detailed description here, and only present the main concepts of the ontology and how they relate so as to better illustrate afterward how it helped us in the rest of the work.

The ontology is divided into five subontologies: the Product subontology, the Technology subontology, the Process subontology, the Services subontology, and the application domain subontology. In the following, we present each of these subontologies, their concepts and relations. The following conventions are used: ontology concepts are written in CAPITALS and associations are underlined. Fig. 1 illustrates how the subontologies combine together. [4]

![Fig 1 Ontology overview](image-url)
A PRODUCT interacts with USERS and possibly other PRODUCTS. It is used by some CUSTOMERS and ENTERPRISE implementing FUNCTION and PERFORMANCE (of the application domain). It is composed of COMPONENTS that can generally be decomposed in DOCUMENTATION and DEVICES. Three kinds of documentation are considered: (i) PRODUCT RELATED, describing the product itself; (ii) PROCESS RELATED, used to conduct manufacture; and (iii) SUPPORT RELATED, helping to operate the system.

DEVICES represent all the parts that compose the devices itself. They are classified in: (i) EXECUTION COMPONENTS, generated for the device execution; (ii) DEPLOYMENT COMPONENTS, composing the executable program and machine; and (iii) WORK PRODUCT COMPONENTS, that are the raw material, the prescription, and anything from which the deployment components are generated.

All those COMPONENTS are, in some way, related one to the other. For example, a requirement is related to product specifications which are related to deployment components. There are also relations among requirements.

3.2 Technology subontology
The second subontology describes the technology needed in product development. The DEVELOPER must know the DEVELOPMENT ACTIVITY that must be performed, the environment the system runs on, and various professional skills. Apart from that, the DEVELOPER must also understand the CONCEPTS of the application domain and the TASKS performed in it. There are four TECHNOLOGIES of interest: possible professional PROCEDURES to be followed, professional STANDARD used, professional LAW used, and finally, the DEVICE’S ENVIRONMENT used in the system.

3.3 Process ontology
A PRODUCT originates in a DEVELOPMENT REQUEST submitted by a CUSTOMER. These REQUESTS are classified either as DEVELOPMENT REPORT or ENHANCEMENT REPORT. DEVELOPMENT REQUEST is divided into PERFORMANCE REQUIREMENT, INFORMATION REQUIREMENT, ECONOMY REQUIREMENT, CONTROL REQUIREMENT and EFFICIENCY REQUIREMENT, etc. One or more DEVELOPMENT REQUESTS generate a DEVELOPMENT PROJECT that will define the different product DEVELOPMENT ACTIVITIES to execute.

We classified the DEVELOPMENT ACTIVITIES in the following types: REQUIREMENT DETERMINATION, ANALYSIS, DESIGN, and IMPLEMENTATION.

Finally, different types of person (HUMAN RESOURCES) may participate in these ACTIVITIES (such as ENGINEERS, MANAGERS, and HUMAN RESOURCES).

3.4 Application domain subontology
The fourth subontology organizes the concepts of the Application Domain as shown in Figure 2. We represent it at a very high level that could be instantiated for any possible domain. We actually defined a meta-ontology specifying that a domain is composed of domain CLASS, related to each other and having SLOT which can be assigned values and FACET that defines constraints for the SLOT is meta-ontology would best be instantiated for each application domain with domain ontology. We also considered that the CLASS in an application domain is associated with the TASKS performed in that domain and those TASKS are regulated by some FACET.

3.5 Services subontology
Services are organizational structure where salesman and surfaceman fill different POSITIONS. We also included the fact that an organization defines GUIDELINES to be adopted in the execution of the E-exhibition which including hotels, catering, entertainment, tour, transportation, telecom, online and consultation. Our goal here was not to define all possible aspects of an organization, but only to define that the development is an activity performed by people in SME with its own rules.

4 E-exhibition system
Most of the current "traditional" web content is geared for human use. Presentation languages such as HTML contain instructions for Web browsers advising how to present multi-media specifically for our visual and auditory perception. However, if we wanted to employ a computer program to search for Web-based information for us, then such methods would find it very difficult to make any sense of these Web pages, unless they had advanced human language skills. Furthermore, contemporary server-side Web languages like JSP or ASP support a
random mixture of model and view parts in a single file, leading to very unstructured content.

The vision behind the Semantic Web is to make web content machine-readable so that it can be more easily analyzed by software agents and shared among Web Services. For that purpose, the World Wide Web Consortium (W3C) is recommending a number of Web-based languages that can be used to formalize web content. RDF Schema and OWL can be used to describe classes, attributes and relationships of E-exhibition in the form of ontology similar to object-oriented languages.

E-exhibition domain models in any of these languages can be uploaded and linked into the Web just like you would publish an HTML page. Once an RDF or OWL file is online, other Web resources or applications can link to it. For example, a HTML page showing a specific product could encode metadata to link back to the corresponding entity in an OWL model so that all applications that understand what a "product" is can make sense out of the HTML page. Or, providers of specific products can instantiate the RDF Schema classes to announce their portfolio to E-exhibition agents in an unambiguous exchange format. A typical scenario for such a Semantic Web application is shown in Fig. 2.

We develop E-exhibition system (E-expo) based on semantic web by combining knowledge engineering, and select the domain of consumer goods as the application domain. E-expo will be divided into the following 8 exhibiting sections: household textiles and garments; home appliances and electronics; furniture and office supply; sports, travel and recreation products; clothing of daily use; arts-crafts and gifts; foodstuffs; overseas exhibits and trade service as shown in Fig.3. It will be an ideal platform for business people from all over the world to exchange information and to promote business.

Fig.2. E-exhibition logical view using Semantic Web

Fig.3. E-expo product catalog according to Ontology Hierarchy
5 Conclusion

While a certain level of interoperability could also be achieved using traditional web approaches, Semantic Web have richer expressivity. The organization of E-exhibition model into classes suggests natural mappings to integrate models into the remaining software components. Furthermore, since every Semantic Web resource has a unique URI, it is possible to establish links among existing models. This means that whenever a model of a specific domain has been published on the Web, then others are potentially able to build upon it, and thus establish a network of domain, and possibly cross-domain, knowledge. While the promise of global knowledge sharing on the Semantic Web is possibly a bit overambitious in the immediate future, RDF Schema and OWL provide at least the infrastructure to build reusable structures among communities of E-exhibition. In terms of future work, there is a need to provide more effective knowledge database and more E-exhibition application in particular that will allow us to better show the applicability of our solution to a wide variety of application domains. In addition, the generalization will eventually improve the international trade of China.

References: