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# Study on Development Strategies of Chinese Library Based on Ubiquitous Knowledge Environment

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**Abstract:** Ubiquitous knowledge environment with five salient features is transferring from concept to reality. The library based on ubiquitous knowledge environment not only faces the rare development opportunities with three levels, but also encounters unprecedented challenges and crises. Building a system with characteristics of high-quality mass knowledge resources, creating a personalized intelligent service system and establishing human values, achieving transfer from the information services to knowledge services, and constructing a highly collaborative library alliance are the only ways for the healthy development of Chinese libraries under ubiquitous knowledge environment.

**Keywords:** ubiquitous; ubiquitous knowledge environment; library; development strategies

## 1. INTRODUCTION.

Because the ability of production and collection of information has far exceeded the ability of organization, management and effective usage of the information, at the beginning of this century, human established the exploration and application of ubiquitous knowledge environment to keep the knowledge in the information. The development of knowledge infrastructure represented by E-science, E-learning, E-knowledge and E-research makes the construction of ubiquitous knowledge environment gradually from concept to reality. Correspondingly, as the knowledge provider and an important node in the library in a knowledge-sharing chain, the library also needs to make corresponding adjustments and changes with the times to better meet the users' knowledge acquisition and communicating needs, embedded in ubiquitous environment, to achieve the library as a "growing organism" of its own organic growth, development and progress.

## 2. THE ORIGIN AND MEANING OF UBIQUITOUS KNOWLEDGE ENVIRONMENT.

The concept "ubiquitous" was first introduced by California, USA Xerox Palo Alto Research Center's chief scientist, Dr. Mark Weiser in 1991. It was also known as "universal" (pervasive), that is, common, ubiquitous and universally applicable. "Ubiquitous" was originally the Latin, meaning "God everywhere." It is used to describe the ubiquitous network. The core idea is that IT people will provide various services everywhere in people's daily lives, which at any time under any circumstances can be interconnected through wireless communication not only between people, but also between objects.

In June 2003, the U.S. National Science Foundation (NSF) held the seminar in Cape Cod called "Wave of the Future: NSF Post Digital Library Futures Workshop" for the first time clearly stated that "Ubiquitous Knowledge Environments" "concept issued after the famous "Knowledge Lost in Information" <sup>[1]</sup> reporting a trend. Because the report described the future of digital libraries to build "ubiquitous knowledge environment", this discussion was also known as the Ubiquitous Knowledge Environment Seminar <sup>[2]</sup>. The ubiquitous knowledge environment is to create multilingual, multimedia, mobile knowledge network to retrieve human knowledge, with a range of services transferring from information services to knowledge services, breaking through the fog of information to achieve common knowledge storing and taking, sharing, discovery and creation, thus promoting progress of knowledge on an unprecedented scale.

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Ubiquitous knowledge environment (referred UKEs), is also translated as “common knowledge environment”, referring to the new generation of science and technology infrastructure made up of the network infrastructure, hardware, software, information resources, human and other organic components in the future of a knowledge-based society fully integrated digital information infrastructure, which by calculation, the maximum storage and communications facilities, people, data, information, tools, equipment and other resources play its role more fully and completely to build a universal, comprehensive knowledge environment<sup>[3]</sup>.

### **3. THE CHARACTERISTICS OF UBIQUITOUS KNOWLEDGE ENVIRONMENT.**

Based on comprehensive analysis of domestic and foreign scholars' researches, the ubiquitous knowledge environment has at least the following salient features:

Firstly, knowledge of ubiquity means users in any place, at any time, and via any network device can obtain information or services to meet the universal access to knowledge, application and creating demand.

The second is the hidden and intelligent nature of knowledge and services. Being hidden means computers and related equipments stay behind the scenes, “hidden” in the knowledge environment. People are often not aware of their existence, but are able to access, use and create knowledge naturally and invisibly. Highly sensitive and intelligent devices through the person's behavior can determine the intent of the person, even are able to adapt and meet the knowledge needs of the people by self-adjustment<sup>[4]</sup>.

The third refers to the collaborative knowledge service system. That is ubiquitous concept, information resources and technology infrastructure which will be fully integrated together to build a seamless, interactive information platform and environment in which people can access, use and create knowledge easily and quickly.

The fourth refers to the ubiquitous feature of users' information behaviors. To meet the information needs of users, a variety of information activities will become more abundant and frequent. Every member of the society consciously or unconsciously has the behaviors about information storage, access, communication, identification, analysis, and application, which has been a common phenomenon in the information society. Especially in the ubiquitous knowledge environment, meeting the current or potential information needs for the purpose of individual behavior has become the part of every member's life or even the necessary to survive. Under the ubiquitous knowledge environment, “information retrieval” will become an outdated concept, the era is an end when it is difficult to locate and obtain information<sup>[5]</sup>.

The fifth is lifelong learning. Human knowledge sharing and lifelong learning have become more relaxed and an indispensable part in people's daily life.

Therefore, the ubiquitous knowledge environment is neither simple information navigation, nor the accumulation of digital information to provide, but an intelligent ubiquitous knowledge network. Under the ubiquitous knowledge environment, where knowledge appears within users' reach in an organized way, the knowledge network will be able to satisfy the user's information needs, to effectively promote the production, transmission and preservation of knowledge, and to achieve the fair share to the hilt.

### **4. THE OPPORTUNITIES, CHALLENGES AND CRISES OF THE LIBRARY BROUGHT BY UBIQUITOUS KNOWLEDGE ENVIRONMENT.**

The creation and development of ubiquitous knowledge environment is not only a technological revolution, but also a change about people's thinking and ideas. It is bound to have a profound impact on the development of the library in the future. How should the library face the reality? The library community should seriously think about these urgent needs like constructing new information resources, carrying out knowledge services, attracting readers' attention and making good use of the library.

#### **4.1 To build the mass knowledge resource system with high-quality characteristics**

Resources support with high quality is the greatest advantage for the library to be different from the search engines and other information service providers, and the resource base for library to carry out a variety of information services under ubiquitous knowledge environment. Libraries can build a complementary and comprehensive security system of digital resources, the open access resources and the hidden network resources. Libraries should take development of local resources and special resources as the emphasis, and collect open network resources and a lot of hidden network resources broadly in the construction of digital resources<sup>[6]</sup>. Then libraries can collect a large number of information resources defined by the metadata standard format processed by digital resources to form the meta-data applications. Digital resources system requires a scientific structure, comprehensive content and distinct graduation. Libraries can also have a self-built database system including self-built and co-collection catalog, digitization and processing systems about collection or special collections, preservation and sharing about literature with their own characteristics. Libraries also have free database systems and other information resources on line, and multimedia video on demand systems.

#### **4.2 To create a personalized intelligent service system**

Under the ubiquitous knowledge environment, the majority of user's information quality and information capacity are greatly improved, but the diverse development of the social information resources environment and appearance of the digital network information resources in large quantity make users have a loss of performance measures when they face mass of information resources separately<sup>[7]</sup>. They hope that the library and other information services can provide intelligent information service support based on individuation to help them never get lost in the ocean of information. Under the ubiquitous knowledge environment, the library should provide three-dimensional, multi-level information services for the information users by using the personalized intelligent information service system, advanced technology and equipment<sup>[8]</sup>. It can not only make users get rid of problems about inefficient and redundant information retrieval by providing users with the basic information services, but also allow users to enjoy personalized intelligent information services experience with the deep and wide selection. In short, the library provides users with literature information, and it is important for users to access the knowledge to solve problems<sup>[9]</sup>.

#### **4.3 To establish the values of humanity**

Over the years, "user-center", "customer first" and "readers first" are important principles and purposes of library work, but it is difficult to be implemented for various reasons. Ubiquitous knowledge environment provides possibilities for the library to implement this concept. Under the ubiquitous knowledge environment, the conditions of library information service are greatly improved. A variety of information exchange activities between librarians and users are connected together by the ultra-micro-computer. Knowledge creation, dissemination and using way take a fundamental change. It greatly emphasizes on interaction between people's participation and human-computer, showing a simple<sup>[10]</sup>, convenient, personalized, free and open features. The value of "user-center" will be fully reflected, and the whole process to provide information services is full of this concept. It can provide personalized information services by adopting the use of intelligent network technology; promote users' experience and human-computer interaction to create a relaxed, efficient, intelligent, friendly virtual knowledge environment.

#### **4.4 To achieve the transition from the information service to knowledge services**

With the rapid development of modern information technology, the means of information service is increasingly modernized, intelligent and networked. The knowledge services to deeply dig analyze and process a variety of scientific information resources, scientific data resources and network resources are increasingly welcomed by the majority of research workers. The document information service of the library should be transferred from a traditional information service to the knowledge service under the ubiquitous knowledge

environment<sup>[11]</sup>. Knowledge service will be the core business of the library under the ubiquitous knowledge environment<sup>[12]</sup>. Against trans-regional, inter-agency virtualization features of research activities under ubiquitous knowledge environment, the library should place more emphasis on excavation of knowledge including direct knowledge and indirect knowledge to achieve the standardized spread of various knowledge systems, help researchers save the time to get information, improve the efficiency of research work, achieve more results, increase the efficiency to get knowledge for user in the knowledge creation process, and achieve transformation between the results of various disciplines.

#### **4.5 To build the highly collaborative library consortium**

Based on the common recognition of the agreement and contract, using modern communication technology and computer network equipment, library consortia can be planned and organized to connect all types of libraries scattered in all regions and systems<sup>[13]</sup>. Its purpose is to give full play to the overall resources of libraries, to achieve the sharing of literature resources. The cooperation mechanism should be a high degree of coordination, the consensus of cooperation, shared interests, mutual interests, co-construction and sharing. Every book and every literature of each resource library in the union is no longer “islands”. Library consortia based on the ubiquitous knowledge environment should get rid of the “large and complete, small and complete” concept and establish the concept with a large resource, and this is the first; the second, we should get sharing of a unified search interface and technology, and sharing of human and literature resources; the third is it should cultivate the alliances awareness, unify the alliances pace, and build the strong organizations. In 2008, 13 libraries in Changchun including provincial and municipal public libraries, colleges, armed forces and research institutes library co-founded the Changchun Library Alliance, built a public service platform and network platform, and realized a one-stop query and card<sup>[14]</sup>. It is reported that the next step is to gradually implement the regional and joint procurement to reduce the cost of ownership documents; to unite the catalog and the number of input data to achieve a multi-museum use; to get joint reference, and play their talents and resource advantages.

## **5. CONCLUSIONS**

The rapid development of modern information technology like network technology, artificial intelligence technology and mobile communication technology, and the combination between some subjects like the modern information technology and nanotechnology, the biotechnology and cognitive science and other disciplines, promote the knowing of people about ubiquitous knowledge environment. The influence it will make on the development of the library is difficult to predict. But the rule of the survival of the fittest is never changed. Librarians should follow the situation, take an active part in this transformation, and adapt to the ubiquitous knowledge environments. We should actively learn from foreign experience and achievements, grasp the forefront of international research and trends, research users’ changes in demand, and re-examine the library’s development strategy according to actual conditions of our country. We should try to build demand-oriented, proactive and personalized information service space and learning environment to meet people’s urgent needs for the information discovery, knowledge production and knowledge dissemination in the information activities, so we can break the constraints of time, and lead the library toward the highest human goal of the sharing of information resources—to make “any user at any time any where, are available to any library’s any information resources”<sup>[15]</sup> forward.

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