The status quo of China Mobile Library Construction

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***Abstract*— With China's rapid economic growth, China has significantly informatization development and progress, narrowing the distance with the developed countries. Development of information technology and the popularity of Internet applications, changing the way people read and approaches, but also changed the library service model and means to go to the library to read has not become read only option out of the library door to extend library services, library services in mobile service to become a major component, automotive and mobile libraries rage. Mobile digital library is a new development direction of the digital library. The libraries all over the world are introducing advanced mobile digital library service applications and are opening the new fields of mobile reading service. But in China, there exist limitations or disadvantages that hinder the development of mobile digital library's service function. To achieve mobile digital library construction goals libraries should explore new or improve functions of service, including unified retrieval the full text reading, document delivery, personalized search and back ground management. These depends on the realization of the function of constructing hand- held devices unified search platform, unified systems, data formats and mobile computing clouds of applications.**

Keywords-component; mobile library; digital librarye; service function

I. MOBILE DIGITAL LIBRARY SERVICES IS AN EXTENSION OF DIGITAL LIBRARY SERVICES

With China's rapid economic growth, China has significantly informatization development and progress, narrowing the distance with the developed countries. China has gone through two stages of information technology forward towards the third stage. The third stage is positioned as the emerging social productive forces, mainly in the Internet of Things and cloud computing as the representative of these two technologies off a computer, communication, monitoring and control of the information content of 4C revolution started networking and social life of all sectors of society to provide full application. Development of information technology and the popularity of Internet applications, changing the way people read and approaches, but also changed the library service model and means to go to the library to read has not become read only option out of the library door to extend library services, library services in mobile service to become a major component, automotive and mobile libraries rage. How to make a library to provide services to those in need, but did not enjoy the service conditions required by (If you can not go to the library, there is no network and computers) can still enjoy the library service, has become an extension library services development. Development of mobile technology for the library to provide this service selection and support , from automotive Library innovative service concept, smart phones , PSP, IPAD and other mobile terminal as a tool, the use of mobile technology to access library resources to service that mobile library will quickly heat up and rapid development. Currently, in the United States, South Korea, most of the mobile library is a library can achieve service delivery, Chinese university libraries in the mobile library building in its infancy stage. Library Services trends in Figure 1.

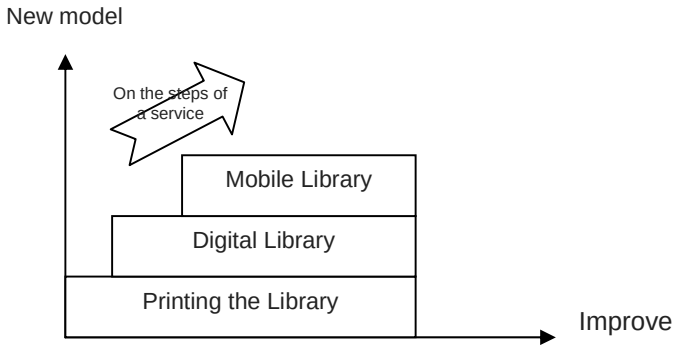

Figure 1. Schematic Library Service Development

II. CHINA MOBILE DIGITAL LIBRARY SERVICES FUNCTION STATUS

December 2003, Beijing Polytechnic University Library opened the first domestic mobile phone short message service platform libraries; mobile libraries opened the curtain in domestic applications. Followed by Hong Kong University Library, Shanghai Library, have opened a text message service , July 3, 2006 , Hunan Institute of Technology launched the first domestic WAP mobile library service , after which , Chengdu University Library , the National Library Dongguan libraries have also opened this service.

September 9, 2010, the National Library in Hall celebrate the occasion of 101 years, the country launched a revamped mobile portal WAP site map "Pocket country chart." So far, China 's mobile library development step onto a new level , by the library community blitz and attention, but Nationwide, mobile libraries in the country has not yet formed the trend, according to statistics , as of 2011 April 3 , China launched SMS service library only 34 , the opening of WAP services , only 16 . And through its site visits, found that nearly half of the WAP site home page can not be opened there, written inquiries function fails and other issues. This corresponds is

ended November 30, 2010, the 20 top-ranking American university libraries, 19 university libraries to provide mobile library services, the penetration rate of 90%. As can be seen , China's mobile library, whether in practice or the development of the start time to its current size above , are far behind foreign countries in some advanced countries . China Mobile library research literature distribution shown in Figure 2.

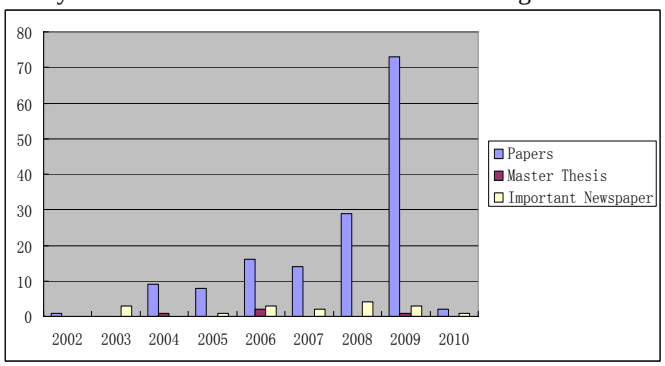

Figure 2 China Mobile Library research literature distribution

China Mobile library services limited transaction management in the book , the reader information management, public information management , information management, collections , based on the opening of the mobile library service 34 Library services are classified, will achieve the service content summarized as follows: (1) Books transaction management. Such as loan inquiries, books (card) loss, appointment books, expiration reminder, etc.; (2) the reader information management. Such as registration information authentication, Feedbac, user management, etc.; (3) public information management. Such as briefing books, lectures notice , premises bulletin premises introductions;(4) collection of information management . Such as bibliographic queries, database retrieval and so on. In addition to these basic information services , individual library also implements a number of personalized services, such as mobile phones , Chongqing University Library in addition to SMS services, an increase of book review system , and the integration of BBS, Blog and other mobile services in Universities ; Shanghai library 's mobile library service includes other reader does not involve lending , two-dimensional code , phone books and other services , and to achieve a mobile version of the "My library " ; Peking University Library 's 3G mobile Books Museum of electronic resources to achieve unified search and full-text reading ; national Library has established a relatively large pool of resources available to provide readers with more than 20 newspapers and more than 1,000 species of library resources . Mobile library service needs of users in Table 1.

TABLE I. MOVE LIBRARY SERVICE USER NEEDS SURVEY

Part of the university library mobile services users in China Needs Survey
OPAC
Personal Loan Service
Electronic Resources Download
Report the loss of library card
Library bulletin information, lecture information
Reference
Document Delivery
Other

Library visits China to provide mobile digital services currently present situation , it's services are essentially confined to the periphery , has yet to launch mobile handheld devices based on various types of resources in a unified database retrieval and text reading service . The reason, mobile digital library extension the depth and breadth affected by the following factors: First, by Internet tariff constraints. Readers browsing through the mobile platform , and query the library some information flow is very small, the corresponding costs are less , if you download a library of digital resources , the larger flow , to pay the higher costs , which the student readers it is a relatively large impact. Second, by the hand-held reading devices screen size and price constraints. Mobile reading on mobile reading device screen size requirements should be higher, if the screen is too small, it will affect the reading results, it is estimated that 2.8 - 3.5 inch screen phones will become the entry criteria. On the other hand, the Internet can also affect the price of mobile phone reading promotion. Third, technical constraints, including complex libraries of different database systems, data formats vary. Chinese part of the University Library WAP site usage is shown in Table 2.

TABLE II. CHINESE PART OF THE LIBRARY WAP SITE USAGE

Library	**WAP Website**
Tsinghua University Library	http://166.111.120.151
Chengdu University of Technology Library	http://mlib.edut.edu.cn
Nanjing Normal University Library	http://202.119.108.190
Tongji University Library	http://www.lib.tongji.edu.cn/cn
East China Normal University Library	http://mlib.ecnu.edu.cn/
Chongqing University Library	http://mlib.equ.edu.cn
Sichuan University Library	http://125.70.226..87
University of Electronic Science and Technology Library	http://mlib.uestc.edu.cn

III. MOBILE DIGITAL LIBRARY SERVICES FURTHER EVOLUTION

Mobile digital library construction goal should be to provide information and library readers access to information accessibility for libraries, it offers information services should be everywhere and at all times; for the reader to obtain information he There should be no time, place, culture, language barriers, and any reader of any information anytime, anywhere access to library resources. Status quo and the ideal target for the gap, it necessary to explore the capabilities of mobile digital library services further evolution.

A. Unified Search Function

Unified search function refers to the mobile digital library on a variety of heterogeneous resources museum unified search interface and a unified retrieval language, to achieve all the collections of electronic resources cross-platform cross-database retrieval, to provide users with journals, papers, foreign periodicals, foreign language papers and book collections isomorphic unified search service. Mobile digital library unified search feature enables various articles in different structures handheld mobile devices can be unified display, search results can be based on the screen size of handheld mobile devices automatically adapt to different

screen display museum purchased digital information, thus realizing the various types of library electronic resources effectively integrated, resolved in the context of traditional independent retrieval readers retrieval inefficiencies.

B. *Text Reading Function*

Text reading function can allow readers to access library electronic resources anytime, anywhere, can improve efficiency in the use of library resources. Because there is a variety of digital library resources, a variety of different resource systems, data formats vary, reading browsers also varies, as a resource retrieval and display, especially mobile phones, MP4 and other small screen to search and display with to great difficulties, so the library has not subscribed to this service at home and abroad.

C. *Document Delivery Function*

Mobile Digital Library Document Delivery function refers to the unified search interface settings document delivery section, the reader Enter your E-m ail mail address, the reader access to the article, after the initial fast reading for individual needs further intensive reading and research articles, you can click Document Delivery button, select the document is automatically sent to the mailbox, to prepare for ease of use the computer when studied carefully read.

D. *Personalized Search Function*

Personalized search is through a unified search interface readers can set up personalized search, keyword and combined easily view. Personalized search with browsing history is automatically saved and collection function, it can retrieve the list when the last number of hits, you can directly click the search again, to avoid the trouble of input time-saving literature browsing history is automatically saved and collection functions. Compared to desktop and laptop, cell phone's browser auxiliary function is relatively weak, on the phone, people rarely open multiple windows, and rarely use favorites. Therefore mobile digital library browsing history and favorites feature can automatically save the convenience of the reader to find information.

E. *Background Management Functions*

Manage function refers to the background by moving the digital library management module library management objectives. For example, in terms of university libraries, every year there are a lot of students into the school and the school, school year when students access the mobile digital library setting permissions, and school hours school procedures is not an easy thing, it can be background batch import reader information management module, batch setting permissions readers. In addition, the mobile station after passing digital library management module provides safe and convenient authentication and authorization operations, the reader sends an authentication message on the phone, the reader click on the link in the message directly after authentication token is generated on the phone, and then later access the mobile readers digital library can directly login without entering any user name and password, and access security is also convenient.

IV. MOBILE DIGITAL LIBRARY SERVICES FUNCTION EVOLUTION APPROACHES

A. *Build Unified Search Platform Handheld Devices*

Mobile digital library depends on the realization of a unified search function handheld devices to build a unified search platform, unified search platform with existing digital library resources consistent and seamless, to achieve various types of handheld devices for different database resources system Search. Currently there are pages based on a specific protocol and analysis techniques implemented in two ways. Technology is based on a specific protocol mainly Z39.50 agreement , Open URL (Z39.88) Agreement , OA IPMH agreement , Dublin Core Protocols and Google Web APIs specification. Page analysis technique refers to the analysis of the HTM L page; extract the valuable part of the analysis of the structured information, and as a basis for further processing. Page analysis technology includes the search page analysis and the analysis of two aspects of the results page. Analysis of the search page is analyzed and retrieval system address resource path search field, retrieval expressions constitute rules; analysis of the results page is the analysis of the results page key field representation of the law, to accurately extract keywords from the page segment content. Retrieval system constructed according to the reader to submit the form contents of each resource system corresponding to the search expression , the system returns from the resource accurate search results to get the key field contents, the output to the reader, to achieve a unified search function.

B. *Unified System and Data Formats*

Digital library resources systems and data formats are not unified, the use of mobile phones for the reader, MP4 handheld mobile devices such as small screen and full-text retrieval to read a great deal of difficulty , so the system and data formats harmonization and standardization of mobile digital library services can be achieved is the key. From the publisher of digital resources in terms of domestic enterprises do not form a unified standard format, all they are doing their own products, which is bound to produce the end product incompatibility. The author believes that, on the one hand, the unification of the data format depends on government departments to play a role in the industry department, and actively promote the development of relevant standards. On the other hand, the digital providers should actively respond to mining. With effective measures to achieve the unity of systems and data formats to achieve a document library , the document collection, document , pages, layers , text, graphics, images, fonts, stamps , metadata , navigation , hyperlinks, plug unified to create, edit , search and information extraction , and provides strong security mechanisms can be set up encryption, authentication algorithm , to meet a variety of applications for document storage, display , retrieval, and security needs .

C. *Mobile Cloud Computing Applications*

Mobile cloud computing applications cloud computing is a concept based on grid and in its evolved on the basis of the new Internet computing model, which is the core of massive data storage and computing . In the cloud computing model, the digital cloud service providers use (super- computer cluster)

for mobile digital library provides a new development idea for mobile users to provide safe, efficient information storage services and network services. The large-scale cloud computing server memory is increasingly rich digital library resources has laid a solid foundation for polymerization , which implements the C / S (Client / Server, Client / Server) structure to a B / S (Brow ser / Server, browser / Server) structure changes in the true sense , which makes the user terminals significantly reduce hardware requirements , the user simply a browser technology to support mobile devices such as mobile phones , MP4 , etc., just to the server-side request , you can enjoy the mobile library service . Cloud computing applications can change the existing mobile library mode. Current mobile library service model digital library resources mainly short message service and a WAP browser-based mobile library site services. However, these two modes have their disadvantages: in SMS mode, users receive SMS messages through custom digital library resources , short message service side are generally finished editing platform delve is not high , resulting in a user access to resources, efficiency is relatively low ; addition , WAP site charges relatively high, so it is difficult to be universal . Mobile Library disadvantages of existing models fundamentally limits the mobile library development , the emergence of cloud computing technolored via SMS to the user , the user can not server in real-time , even if the problem is a short way of reply to the message server , the server the first time it is difficult to answer . In WAP site mode, due to the current WAP site created much, so the digital library resources are very limited; WAP protocol itself and because the data transfer rarefy to make up for these shortcomings , making the mobile library model has undergone a profound change. In the cloud computing model , a large number of digital library resources will be stored in the cloud server, all operations are completed on the server side , the reader simply use mobile devices to access the cloud through the browser to choose the required .

V. OUTLOOK MOBILE LIBRARY CONSTRUCTION

From the construction and operation of the mobile library practice, at this stage as a mobile library service phone platform is not yet clear advantage. Should focus on the following aspects of the development of mobile libraries.

A. Build Improve the Application of Various Types of Mobile Library

With the big screen the growing popularity of smart phones, mobile Internet tariff reduction and support for Wi-Fi networks popularity of mobile phones, through the mobile Internet has become a popular trend. With the growth of population after 90 student readers (including graduate readers) will be more mobile access to libraries. Various mobile phone operating system client developments will become the focus of future mobile library construction, based on the current development trend of mobile phones, mobile libraries should provide at least based on Apple phones and android (Google Android) phone system applications.

B. Build Combined with 3G Technology in Mobile Reading Service

As the 3G era, the data transfer speed has been significantly improved. New mobile devices (such as Apple ipad series) appearance, making the video, audio and other multimedia transmission on mobile devices a reality. Library users can at any time through the 3G technology to provide a rich variety of library resources, such as they are interested in online browsing digital books, audio and video and other multimedia resources, while providing a more convenient service.

REFERENCES

[1] Howard Rheingold.The Virtual Community:Homesteading on the Electronic Frontier.MIT:Addison Wesley,1993

[2] Teen J,Alvarado C,Mark S,et al.The Perpect Search Engine is not Enough:A Study of Orienteering Behavior in Directed Search[G]//Proceedings,SIGCHI Conf.Human Factors in Computing Systems.Vienna:ACM Press,Tuscon,2004:415.

[3] McMartin F, Iverson E, Wolf A, et al. The Use of Online Digital Resources and Educational Digital Libraries in Higher Education[J]. International Journalon Digital Libraries. 2008(9):65-79.

[4] Wolcott L L,Betts K S.What's in It for Me? Incentives for Faculty Participationin Distance Education[J].Journalof Distance Education,1999(2):34-49.

[5] Joel Cummings,Alex Merrill.The use of handheld mobile device:their impact and implications for library services.Library Hi Tech,2010,28(1):22-40.