



## **Innovative Information Services in the Digital Age**

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### **Abstract:**

*With the explosion of information and the popularity of the Internet, librarians have faced new challenges to look for new ways to meet the user's new demands and expectations. The need to bring information to various users has encouraged the creation of many innovative services linking new technology with traditional library information services. This article explores information pushing programs, other E-reference services and knowledge service as potential sources of innovative reference programs in the digital environment on the basis of practice of the NLA's reference services.*

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### **I Practice and innovation of push service at NLC**

#### **1. Why the NLC provide “push” service**

##### **1.1 Pursuing personalized self-services becomes a popular trend**

With the fast development of information technology and the increase of information resources, people are more and more inclined to choose various sources of information besides the library. They ask for help only when needed.

##### **1.2 The challenge of “immersed in data but hunger for knowledge”**

Users often find that most of the information they search for through the Internet overlap or are irrelevant to what they want. They don't know how to choose the right one in the information sea.

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### 1.3 Librarians' bewilderment

The staff of the NLC are always looking for ways to improve services to the patrons. In digital age the librarians face such kind of bewilderment: despite the librarians' best efforts, most users know little about the services that libraries offer. The problem is how can librarians extract users' needs and provide personalized services.

In order to solve the problem a new technology of push is put to use in library. Its aim is to transform service mode of 'users-look for-information' into 'information-look for- users'. Information will be delivered to users timely. Users may get the new information issued from the website without visiting it every time.

## 2. Analysis on the characteristics of user information need

The Reference Department of the National Library of China used a survey questionnaire in order to find the users' attitude to the reference services, the users' comments on the way of service and the usage status of the collections of the NLC and the problem of NLC's service toward the users. The questionnaire was directed towards users who once used virtual information desk delivered through the Internet from May to June 2010. 60 answered out of a sample of 100 users, making a total response percentage of 60 percent.

### 2.1 Patrons' personal information

**Table I Educational experience of NLC users, 2010**

	Options	Numbers	Percentage	
1	Doctor	11	18%	
2	Master	19	32%	
3	Bachelor	20	33%	
4	College	8	13%	
5	Below college	2	3%	

Table I shows that most people (80%) who used virtual reference services had a university degree. They were more inclined to get information from the Internet.

**Table II Careers Dimension**

	<b>Options</b>	<b>Numbers</b>	<b>Percentage</b>	
1	Students	18	30%	
2	Teachers, professors	14	23%	
3	Researchers	12	20%	
4	Public Servants	1	2%	
6	Employees of Industrial Profession	3	5%	
7	Employees of Service Sector	4	7%	
9	Retirees	2	3%	
10	Freelance	1	2%	
12	Others	5	8%	

From the career backgrounds of those who use virtual information desk, it is concluded that the students, teachers(professors) and researchers account for 73%, which means that the main target group of the virtual reference service are those with teaching and researching needs, while less of industrial or entertaining needs use this service.

## 2.2 About the virtual reference service

**Table III the approaches to know about the Virtual Information Desk**

	<b>Options</b>	<b>Numbers</b>	<b>Percentage</b>	
1	View it randomly when surfing the Internet	13	22%	
2	Introduced by friends	5	8%	
3	By the Publicity of NLC	7	12%	
4	Find the access to this service on the NLC website initiatively	42	70%	
5	Other approaches	3	5%	

The survey shows that 70% of the users try to access to this service on the website initiatively. It is a high proportion, which means this user group has initiative and a basic knowledge about the library business and operation.

**Table IV The reasons to prefer NLC online reference services**

	<b>Options</b>	<b>Numbers</b>	<b>Percentage</b>	
1	NLC's abundant resources	<b>54</b>	<b>90%</b>	
2	NLC's plentiful service items	<b>23</b>	<b>38%</b>	
3	NLC's high prestige	<b>21</b>	<b>35%</b>	
4	NLC staff's high-quality Service	<b>19</b>	<b>32%</b>	
5	Other reasons	<b>6</b>	<b>10%</b>	

This question is designed to understand why the National Library of China can attract the online users. Through the statistics in the above table, 54 users choose Option 1, thus it is clear that NLC's abundant resources is the highlight. For the other 3 alternatives, each of them are chosen by about 20 users, which means that these factors also play a important role in attracting users, but not so significant comparing to option 1.

**Table V The content of the questions raised for the online reference**

	<b>Options</b>	<b>Numbers</b>	<b>Percentage</b>	
1	Ask for service guide	<b>31</b>	<b>52%</b>	
2	Literature search	<b>35</b>	<b>58%</b>	
3	Use of the digital resources	<b>21</b>	<b>35%</b>	
4	Ask for E-resources	<b>24</b>	<b>40%</b>	
5	Acquaint with the NLC activities	<b>9</b>	<b>15%</b>	
6	Access profound reference service	<b>17</b>	<b>28%</b>	
7	Others	<b>3</b>	<b>5%</b>	

Through the statistics, it is concluded that most of the users' needs to the online reference service are focusing on the literature search and access; the needs of getting library service guide are just behind. Few needs are about the extending services, such as research reference, cultural activities, etc.

**Table VI The preference of channels to access reference service**

	Options	Numbers	Percentage	
1	Face to face reference service: affective intercommunion and easy to get the trust of users	9	15%	
2	Telephone reference: fast and convenient, but high cost	22	37%	
3	Email reference: easy, any time and any place	23	38%	
4	Virtual Information Desk: real time, interoperable and combining the advantages of the above mentioned	51	85%	

In the survey on the preference of channels to access reference services, 51 users of 60 choose online reference, 23 users choose email reference, 22 users choose telephone reference and only 9 users choose face to face reference. In this array, those more virtual channels are preferred by the user, which indicates that they pay much attention to the convenience of the reference service channels. Moreover, convenience is the major advantage of online reference.

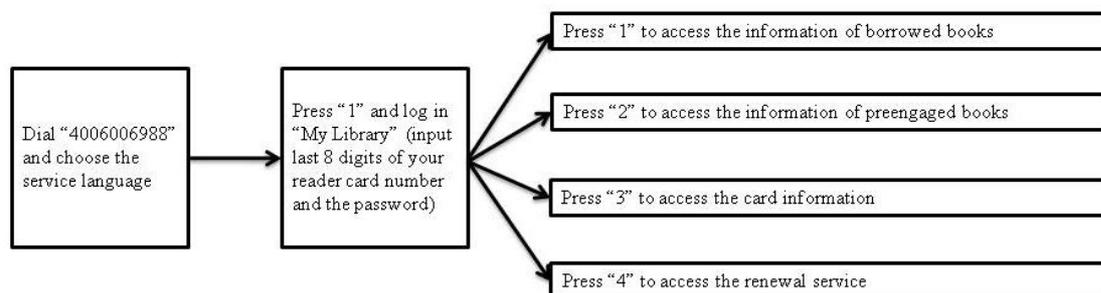
### 3. Push service mode for the long-distance reader

#### 3.1 Call center

Call center was put to use in September 2009 with number 400-600-6988. It is a kind of communication system based on Internet. It has broadened the information communication channels between readers and library with the function of pronunciation inquiry and pronunciation self-service handles in all days.

The voice self-service linked the Call Center with the application systems of the NLC (for example, Aleph system). Those who own a reader's card can deal with series of business by phone. At present, its functions mainly include access to the information on borrowed books and pre-engagement of books, renewing books and access to the information of the reader's card. (See Table VII)

**Table VII: Framework of self-service of the Call Center**



### 3.2 Push service by means of E-mail

E-mail push service at the NLC began at the beginning of 2010. The contents it pushes are "top 10 questions" in the last week of every month. Users' top 10 questions are:

- How many sites does the NLC have?
- What is its layout?
- How to get a reader's card and whether is there self transaction of applying a reader's card?
- The way to search the collections of the NLC;
- What kind of illumination will it show that means the collections could be borrowed out when searching through OPAC?
- Which collections should be borrowed through reservation on OPAC?
- The ways about renewing borrowed books;
- Which full text database could users use outside the library?
- When and where the NLC holds lectures or exhibitions?
- What are the contents of SMS services and how to access?
- Is the wireless network available?

One of the TOP 10 questions and its answer are chosen to be made into poster every month.

The NLC selects available E-mail addresses from webmaster and web forms as push services patrons. The email senders are registered in the table of push service. Then the poster will be sent to them. An electronic questionnaire is also attached to the email through which the NLC could know the way and content of push service the users need. The statistical results of the questionnaire are to be recorded in the push service forms.

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### **3.3 Information pushes through mobile phone**

The NLC provides push information services through SMS or certain kind of information or all public information that patrons has customized through web or SMS. This kind of information includes reminders of returning books, renewing books, readers' card overdue, news at the homepage of NLC, guide to borrowing books and readers comments and suggestions, etc.

### **3.4 FAQ push service through the web**

Information services of the NLC are mainly traditionally passive. Most of the users access the resources from the websites. As the levels of their search abilities are differently, the search results vary greatly.

FAQ is an effective way to transform passive services to active ones. When Users browse FAQ they might also notice some other relative information they need. From this sense, FAQ is a kind of push service. The library could refer to the need of users to manage or organize resources. Thus it may be some of help to transform the traditional service mode into more individualized one.

### **3.5 Push service through VRD**

Virtue reference desk may be used as a platform for real-time or postponed communication between reference librarians and patrons, through which reference librarians could push information to users.

According to the software design, the times the users' access to VRD system could be counted and be absorbed in a very useful information storehouse. The reference librarians search the information storehouse firstly and then select the users more frequently access to the VRD to push information, thus the library could establish more close relations with them.

The VRD mode of push service is realized mainly through web forms and real-time reference. It is easy to do but the problem is obvious.

## **4.1 Interaction and personalized push services**

Personalized push services mean the system could collect and sort information according to self-describing a user's need and send it to the user. Now it has two kinds of ways to push:

- Asynchronous information push

This way of push would inform the users when new collections users' need come. For example E-mail push service. The shortcomings of asynchronous information push are not real-time and when users get the news they have to access to the system to read the information and the size of the email-box might also cause the information missing.

- Synchronous information push

This way of push would push the information to users' desktop when new collections they customized come. Users could browse it freely online or offline. It is a more active, highly effective and pertinent way. Only considering the users' information need, could librarians realize the individualized services. It combines resource search, resource recommendation

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and reference services into one way of service. It can trace the characteristics of users' need to recommend information and promote the effective use of the digital collections.

#### **4.2 Screensaver information push**

The OPAC can also deliver a kind of information push. There are many computers in the hall waiting for the readers to use. When the computers are free, the news board may be put into the spare computers screensaver information and push it to users.

#### **4.3 BLOG**

Blog has now become the bridge of communication between library and patrons because it is an interactive platform. Library may make full use of BLOG to set up "a field of communication" where patrons could express their ideas freely. Users could turn in the information they need (such as how to get the resources, how to use digital database, etc) through reading, answering, commenting or linking. Library answers these questions quickly and adopt the advice and could understand the users' need timely.

#### **4.4 RSS used in information push**

If RSS were used in reference services, the service level could be greatly promoted and users' quick and accurate information need might also be met.

- Librarians could customize special topic information through RSS

Library often issue information about new services, new database tryout, use of collections, reader's training and change of service time and contents. As the news is very important for readers, the NLC push the information to the users through RSS. The users could enjoy the services immediately after the new services come out.

- Research on self-virtual reference services through RSS

The library is able to upgrade the functions of VRD' self-service through RSS technology. The system could memorize the users' information need after they enquire through the VRD and send relative information constantly without reference librarians' participation.

Users may collect RSS information and form their own information portal through browse window or reading software.

The librarians could adjust service contents through individualized users' information warehouse where there are information about users information taste.

In conclusion the information push service meet users' quick and convenient information need, however the reference services should also meet users' much deeper information need.

## **II Knowledge service practice and prospect at NLC**

### **1. Need of the knowledge society development**

Nowadays with the development of information technology and the coming of knowledge economy, people' need for knowledge information have changed. What they need are not

simply document deliver services but reference librarians directly participate in solving their problems. As one of the important links of knowledge innovation and spread, the library should innovate traditional mode of reference services, and transit the intellectual services based on traditional reference services into knowledge services.

## 2. Survey on users' knowledge service needs

### 2.1 Basic information of the questionnaire

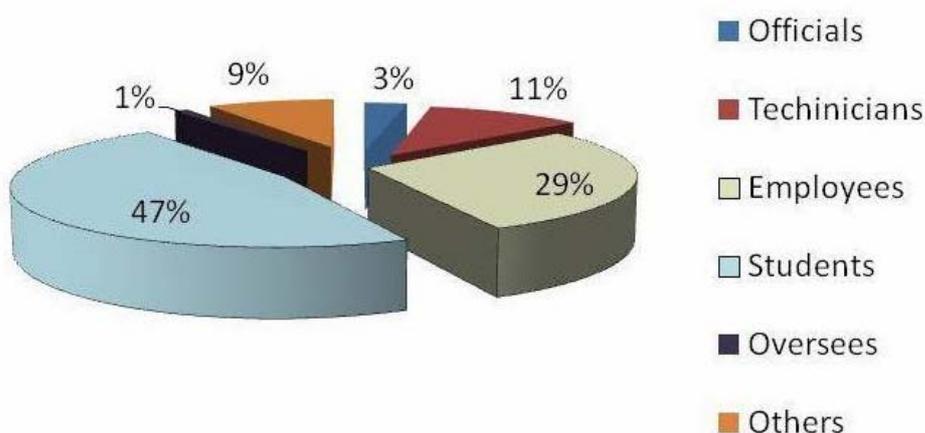
In order to find out the users' needs, the NLC made a survey from the end of 2007 to the beginning of 2008. The questionnaire mainly focuses on the following three aspects, users' background information, access to the resources and services. The questions include users' age composition, educational levels, and preferred type of resources, access methods and purposes, most of which are multiple choice questions and easily understood by the users.

### 2.2 Survey result and analysis

1800 questionnaires are delivered, among which 1494 copies are returned and the average response rate is 83%.

The survey shows that onsite users of the NLC are mainly aged 18-30; educational levels are mainly of university background (bachelor's or master's degree); their professions are mainly students, while the military, teachers (professors) and public servants take a certain percentage.

**Table VIII Reader Category of NLC, 2008**

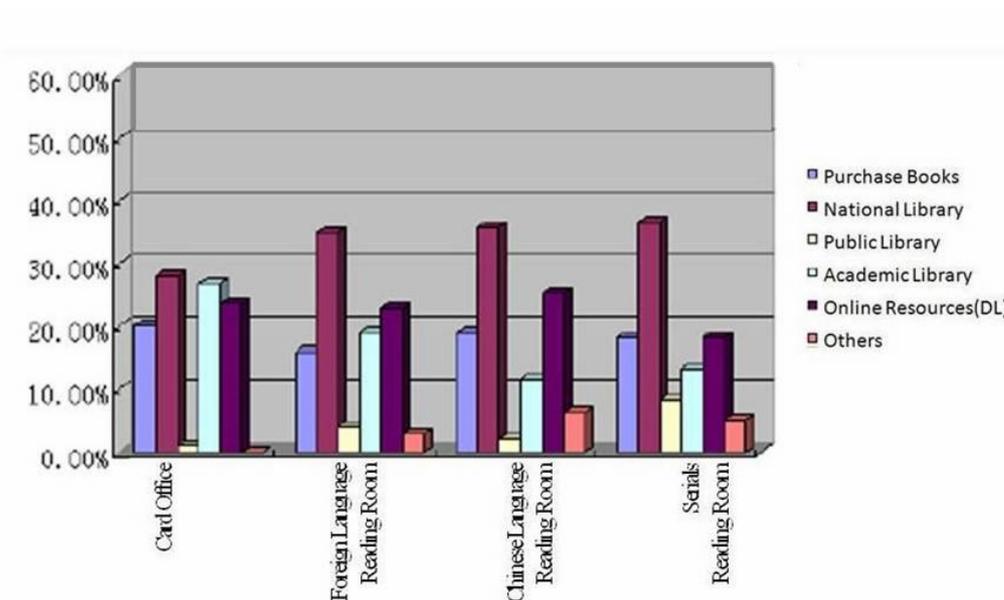


### 2.3 Readers' usage status of the NLC resources

According to the readers' usage status of the NLC resources, most of the readers' answers to the question "the main sources to access the literature" are "National Library of China"(28.09%), "academic libraries"(26.97%) and online resources(23.6%).

See the chart below.

**Table IX Sources to access literature**



#### **2.4 The main purposes of using the library resources are scientific research and paper writing.**

Concerning the users' preferred personalized services, most of them choose "online subject reference service" (Zhao Xing.2009).

With the development of the users' needs, library service has already been provided offsite, and the librarians initially communicate with the users and try to provide personalized service according to their different features, for example, the Reference Department of the NLC provides media track services, etc based on the different needs of government agencies and companies.

### **3. Concept about knowledge services**

Knowledge services here refer to programs that librarians collect, analyze, identify, synthesize relative information based on library information science when users require, use and innovate knowledge. (Yan Jingbo& Li Yuling. 2010.)

### **4. Case study on knowledge services**

Although lots of papers about knowledge services have been issued up to the present, most of them were academic and made little difference to practice of knowledge services. Below are case studies of reference services which have characteristics of knowledge services. It is expected this may help to guide and promote the development of knowledge services for the

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future.

## **4.1 Pattern of personalized knowledge services**

### **4.1.1 Case of reference service**

The Reference Department of NLC has begun to provide information about urban planning, urban construction and urban development for a municipal committee of urban programming since 2005. Although the patron gave the search boundary, the result would be too much if we only use the keywords the patron provided because of the wide extension of urban planning. In order to know of the needs of our patron exactly, the reference librarian read plenty of documents about urban planning; filtered relative keywords and exchanged ideas with the patron. By this way they tried to make the key words close to the patron's need. After they communicated several times, the librarian abstract the key words of "constructions of urban public utilities", "urban and rural development as a whole", "urban spatial arrangement", "balanced development among regions", "estimate construction of urban", "conservation of historic cultural cities", "industrial restructuring of urban" and searched lots of media information. The librarians also paid attention to everyday news in this field and select special topic. For example during flood seasons the streets were often flooded in some cities many times. The librarian took the city drainage system as a special topic, searched news about it and formed subject information handed to the patron. The librarian has been an expert on collecting the information about urban planning just based on tracking the news over the long range, for the librarian is not only able to communicate with the patrons but also give advice about information needs. This way of reference service gains high praise from the patron and is extended till now.

### **4.1.2 The characteristics of the case**

Their searches go beyond traditional pattern (the librarian search information according to the key words that the patron provides). The librarian ascertains the key words by himself, goes deep into the topic, construes the key words behind the topic, and uses the knowledge to organize information. Only if the librarians have the close knowledge level to the patrons, could they search exact information for the patrons.

## **4.2 Provide media analysis services with intelligence analysis technology**

The reference librarians of NLC had been monitoring public opinion from 450 Medias, like network, TV, print media on the topic of Art Galleries, Public Libraries and Culture Centers free to everyone from January 11 to February 11 of 2011. Then the librarians analyzed public opinions about the free charge policy and gave appropriate recommendations.

Traditional analysis couldn't assure the results accuracy, for it only based on experience to judge and was unable to give quantitative analysis on public attitude. The reference librarians could provide services of relatively objective and systematic analysis on information that collected by platform of public opinion monitoring system and Media monitoring network.

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The analysis method was both quantitative and qualitative. This was a kind of intelligence analysis. The knowledge services “emphasize the librarian processing the documents into information ‘products’ of unique value and solve the patron’s problems with his own knowledge and ability.” (Zhang Xiaolin. 2000)

### **4.3 Subject Service**

The Reference Department of the NLC was commissioned to provide domestic documents about legislation evaluation system by a legislative in 2009. At that time the legislation evaluation system was new in China and difficult to find relative materials. The reference librarians responsible for the subject traced the reference documentation to find “quotations” starting from the point of view of legislative effectiveness and legislative systems. They found more and more relevant documents by the clues in the quotations and made the clues of “quotation” close to the subject step by step. At last they filtered the search terms such as “legal effectiveness”, “the force of law”, “legal practice”, “legal value”, “law enforcement”, “legislative look back” and so on. Finally they understood that assessment on the enforcement of a law was one of the important ways of legislation evaluation. According to the terms they found some matching cases such as collections of documents about “American E-Government performance evaluation system”, “performance evaluation about Enforcement of ‘Law of Japanese Home Appliances Recycling’ after 4 years”, “legislation evaluation on Management approach of protection environment of Service Industry in Hang Zhou” and so on. The clients were very pleased with our reference services. (Zhao Hong. 2010)

The reference librarians’ subject knowledge played an important role in this kind of reference services. With professional knowledge background they had been collecting and collating information about one subject and even doing research about it for a long time, so they could provide analyzed information resources exactly.

### **4.4 Provide consultation report**

Some White Spirit Co., Ltd. asked the Reference Department of the NLC to help with their application for state-level intangible cultural heritage item. The reference librarian started from the point of view of the origin of Beijing Erguotou (a Beijing liquor brand), traditional brewing production process and technology successors. Then they ascertained the origin of Beijing Erguotou through the historical data. In the meantime, they compiled out the inheritance of traditional brewing technology successors. After visiting the brewing process of Erguotou on the spot, the reference librarians also compiled the map of it according to the historical materials. The librarians communicated with the clients at every step and often participated in the symposium of the corporation. They took the advice of the experts and adjusted the search methods. Finally the reference librarian wrote a 20,000 word report based on the materials. The clients applied for Beijing and State-level intangible cultural heritage item successfully taking advantage of the report.

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The case may be a kind knowledge services. The report became a knowledge product which was made by the librarians' creative work. It reflected the service mission of solving the problems for users. The service was a breakthrough for the traditional reference service mode and had the features of knowledge services.

## **5. Innovative Information Services in the Digital Age**

A conclusion can be drawn from the above reference cases that what the clients need in the digital age are not only information or documents but processing of the information into "products". The "products" are combined with documents, analysis and conclusion. The librarians have to innovate in reference and information services to meet the clients' changing needs.

### **5.1 Selected knowledge services**

Although the information needs of the patrons always develop toward knowledge need. Years of experiences tell us that knowledge services are not suitable for all users. As the questionnaire above shows most of the patrons reference needs are document delivery. To point out that most of the reference services provided for the VIP clients of the NLC (researchers and legal institutions) belong to knowledge services. Experts of some subjects may not need knowledge services because of their more professional knowledge than the reference librarians. The kind of knowledge services they need may be the other fields that they are not familiar with.

### **5.2 Establish subject librarian system**

In the field without subject librarians, encyclopedic reference librarians have to face more unfamiliar professional knowledge. Reference librarians have to participate in the patron's research and tracking his changing need in the digital age. Therefore it is necessary to establish a subject librarian system to transform the mode of the reference services into knowledge services.

### **5.3 Embedded in the process of users' research service**

The Subject librarians actively communicate with users and track users' research subject process. This will be very helpful for their research. These kind of services fit for the long-term users and long-term subjects.

### **5.4 Introduction of intelligence analysis method**

The intelligence analysis methods used by scientific and technical personnel at intelligence institutions are very different from the traditional service mode and concept. The intelligence analysis theory and mode widen the library reference services outlook.

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## Conclusion

The library has a long and distinguished tradition of providing rich and relevant services for users. The mission of the library is to connect users with the information they are seeking. The integration of new information technology has actually become the catalyst that transforms the library into a more vital and critical intellectual center of life today. Libraries are about collections, but they are also about providing much more. This is a time of experimentation and exploration for new services. The libraries must provide a user-focused suite of reference services. This is the future of information services.

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