The Gap between Users and Cataloging -
Description and Analysis of Survey Data in Chinese
Academic Library

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Abstract:

The objective of this study was to examine the gap between users and cataloging from users' perspective. A questionnaire survey was conducted in Nanjing University Library in China. The survey results describe the user experience of OPAC searching, finding books in open shelves, and how willingly users want to enhance catalog. The data analysis indicates that there are problems in description cataloging, subject heading and classification. The users' feedback cannot reach cataloging process, which is really needed for cataloging control. On the other hand, users do want to participate with library services. But the barriers between users and cataloging cannot be broken, because the Workflow-Oriented Architecture of current Integrated Library System (ILS) prevents users and cataloging from cooperating together. The fundamental solution is to re-design the ILS through User-Oriented Architecture. The paper explores an experimental attempt to establish a cataloging Open-Platform model.

1. Introduction

As one of the operations during library workflow, Cataloging dose not face users directly. But the quality of catalogue is the important factor that affects user experience. Classification decides the subjects that a book belongs to, which is the base line of shelflisting. Users find books depending on the support of classification. The descriptive cataloging and subject heading help users to search book in OPAC

(Online Public Access Catalog). The Precision Ratio and Recall Ratio of OPAC are related to cataloging, which are impacting searching effectiveness deeply. Cataloging is the connecting bridge between users and books.

There are many cataloging studies that draw close attention to library users. Madison, for example, designs user-focused digital content based on FRBR (Functional Requirements For Bibliographic Records) framework[I]. The FRBR serves as a useful tool in building expanded access and content system, helping users to find, identify, select and obtain resources. Westrum establishes mash-ups to provide better services to users. She says the key to the future of the library catalog is openness[II]. Rolla compares user-supplied tags with subject headings. He finds out that catalogers and users approach these descriptors very differently [III]. Dezelar-Tiedman compares user tags with the controlled vocabularies, and found that personalized tags are broader than the controlled vocabularies and very useful in improving access to library collections[IV]. Chen uses a blog and some Web2.0 tools to enhance cataloging section activities. He suggests that the user demand for the convergence of library bibliographic organization and the new web infrastructure is reshaping the future of all library services[V].

All these researches listed above are from the perspective of librarians. They take series of movements in order to meet the user's demand. However, do our users think in the exact same way as librarians? Does cataloging support using well enough? What are users thinking of cataloging? What are they expecting? With the purpose of answering these questions, this study addresses the user's perspective. It conducts a questionnaire survey to describe the relationship between users and cataloging in users' mind. Prior to this research, several articles have already explored survey among users. Kathryn describes a survey on the impact of the Cataloging in Publication (CIP) program on library operations among U.S. libraries in 1982. High use of CIP for cataloging purposes, medium use for acquisition activities, and low use for public services are reported[VI]. Martin's survey accesses within the OPAC in 2007. He discusses the cataloging workflow of the University of Michigan and analyzes the cost-benefit of the amount of effort to catalog new collection materials in relation to the benefit the cataloging provides to the library users[VII]. Hider puts his emphasis on the OPAC searching in 2008. The survey turns out that rather than making do with less, users want more bibliographic data, including more content details and additional elements[VIII] Fatima compares users from two different areas in India in 2011 [IX]. Liao presents a comparative study on information needs and information-seeking behavior of international graduate students and American graduate students in 2007[X].

The significant differences of this study are that

- It collects data from Chinese library users. The surveys conducted before are mostly focusing on America or Europe. A few articles discuss users from India, Philippine et al. Studies about Chinese are very rare. China is a country with large population. There are a large amount of people reading books. The unique characteristics of Chinese library users are valuable to be researched.

- It lays emphasis on academic university library. There are several kinds of

libraries such as national library, community library, college library, school library and et al. Different libraries serve different users. The needs of them various dramatically. This study has a close eye on academic users from university. Most of them are in-service teachers and graduate students, who are engaged in doing research.

- The survey data explored this paper were collected during October 28 and December 31, 2011. Except the Indian study, surveys mentioned above were all conducted several years ago. Since the rapid development of Internet technology, life style has been transformed dramatically. In that case, user demand changes day by day. This study presents the latest data description and analysis.

- This paper explores a new measurement, which is annual reading quantity of a user, to distinguish the one really read from general users. As shown in the data analysis, it is proved that this new measurement has more reference value than others.

- The aim of this paper is to investigate the effectiveness of cataloging according to user experience. It evaluates the helpfulness of cataloging in finding, identifying and selecting library collections not only in OPAC, but also in open shelves. In addition, the paper also concerns with the users' expectations and how willingly they want to enhance catalog.

Concerning the relationship between users and cataloging, we describe three entry points. It is where the study begins, based on which the questionnaire is designed.

Three Entry Points

(1) Searching library collections in OPAC based on descriptive cataloging and subject heading. The completeness and accuracy of information retrieval affect user experiments seriously. Several questions about OPAC searching will be presented in questionnaire.

(2) Finding books in open shelves with the support of classification. Shelf listing has a close relation with classification. The call number of a book, which assigned during cataloging, decides the location of books. The conveniences and effectiveness of finding books under the Chinese Library Classification is the second point that we want to discuss with our users.

(3) As supplementary methods of traditional cataloging, wiki cataloging, personalized tag, and other Web2.0 applications could be useful. The survey concerns how willingly users want to contribute data to the catalog. Furthermore, what are they expecting of cataloging other than finding and searching resources.

2. Methods

2.1 Sample

Data are from a 1,362 survey of Chinese library users, most of them are teachers and students of Nanjing University. Nanjing University is one of the most famous

academic universities, ranked fifth in China. She has a long history. This year (2012) is her 110th founding anniversary. Nanjing University has a comprehensive subject distribution covering Science, Social Science and Humanity, which could benefit the survey for collecting data from users with different kinds of majors. There are undergraduates, graduates, PHD candidates, postdoctoral and in-service teachers of all age groups in the university, which ensure the diversity of sample crowd.

For practical and economic reasons, data collection was carried out mostly in Nanjing University. According to the characteristics of Nanjing University listed above, we believe that the survey respondents are a representative sample of academic university users in China.

Survey limitations: Since the survey focuses on the academic library. The result excludes the vocational college users, who are probably concentrated on vocation training materials.

2.2 Data Collection

To take into account of the difference of users in age groups, majors, and catalog using patterns, questionnaires are distributed in several different ways.

For on-site catalogue users, an online survey is presented via library Homepage, Campus BBS, and several Social Network Services such as SinaWeibo, Tencent Weibo, et al. Push-mails are explored to gather information from professors who have being getting in touch with librarians before. 583 online results are obtained.

For users have the habit of reading books in library, most of who are undergraduate students preparing the National Graduate Entrance Examination. Printed questionnaires are distributed. 300 Respondents are selected randomly. There is no one declining researcher's invitation. This yielded an encouraging response rate of 100%.

For the absent users' sake, a printed questionnaires survey is administered during lectures of resources utilization in several departments. A total of 300 questionnaires were distributed, for a response rate of 67%.

There is a one-week reading festival held in Nanjing University once a year. Users interested in reading and library services were interviewed face-to-face during the festival. Besides the topics in the questionnaire, users share what they thinking about library services with interviewers. 278 individuals were interviewed.

For the convenience of data analysis, the printed questionnaires are inputted into the online survey manually after interview. A total of 1,362 results gathered. The total response rate is 76%.

3. Results

3.1 Overview

According to the survey results, the basic characteristics of library user are shown in Table 1.

Table 1. Profile of Library Users

Characteristics	Library Users (%)
Age Group(years)	
<=25	66.59
25-30	24.45
30-40	6.68
>40	2.28
Total	100.00
Gender	
Male	43.47
Female	56.02
Unknown	0.51
Total	100.00
Identity	
Undergraduate Student	27.97
Graduate Student	53.74
PHD Candidate	12.56
Professor	5.72
Total	100.00
Subject Fields	
Science	40.6
Social Science	33.99
Humanity	25.4
Total	100.00
Annual Reading Quantity	
<10	
10-50	18.43
>50	61.38
Total	20.19
	100.00

User ages varied from 18 to 55 years. But two-three (66.59 percent) were under age 25. Nearly one-four were over age 25 and under age 30. Only about 10 percent

of users were over age 30. 56.02 percent of users were female while 43.47% were male. 0.51% respondents did not fill in gender options.

53.74% of users were graduate students. Undergraduate were over one-forth (27.97 percent). It suggested that most of users met in the library and campus were students, mostly under age 30. PHD candidate and professor were rarely showing up both in library and on web. The few professors accepting the survey were those who usually get in close touch with librarians by email. They were absorbed in the latest change of library resources and services.

Above two-five were Science users, most of them liked to complete questionnaire online. Social Science and Humanity users on the other hand, preferring to reading books in the library hall, were inclined to accept the survey face-to-face. 33.99 percent of respondents were majored in Social Science, while 25.4% in Humanity.

With the purpose of focusing on the users who were really reading books, another measurement was introduced as a factor. It was a user's annual reading quantity, which could help researchers to distinguish the one really read from general users. Over 80% (61.38%+20.19%) of users were reading more than ten books a year. One-four of all respondents red book more than fifty annually.

Table 2

User Identity	Annual Reading Quantity		
	<=10(%)	10~50(%)	>=50(%)
Undergraduate	18.64	66.40	14.96
Graduate	19.95	61.48	18.58
PHD Candidate	11.70	50.88	37.43
Professor	17.95	58.97	23.08

In Table 2, users are grouped by their identity. The results show the annual reading quantity of different kinds of users. More than 80 percent of respondents reported that they red more than ten books a year in average. They were the kind of user who assumed to be interested in reading. In each group, the percentages of reading-interested users are very close, that is 81.36%, 80.05%, 88.3% and 82.05%. It suggested that the proportion of reading users are quite the same, no matter they were teachers or students. Only PHD candidate reported a little higher percentage(88.3%). Since PHD candidates is a special crowd who are devoted themselves to prepare their doctoral dissertation. It is supposed to be reasonable that they read books a little more than other users. The survey results indicated that users' reading habit and their identity were not necessarily related. The users really interested in reading were those who suppose to visit library and use library tools more frequently. They were the reading interested users worthy of concerning with. Advices from them would have higher reference value. With the purpose of distinguishing the reading-interested users, this paper explores annul reading quantity as a main factor other than identity.

3.2 Effectiveness of OPAC Searching

OPAC searching is the main entrance to find and select library collections. The completeness and accuracy of information retrieval impact searching experiments substantially, which are the most important measurements of searching effectiveness. Search terms include title, authors, subject term et al. are provided by librarians through description cataloging and subject cataloging. Therefore, the recall and precision ratio are deeply influenced by cataloging. In that case, cataloging interferes with searching effect and user experiments deeply. It is always cataloger's responsibility to improve the quality of description and subject heading. Data were gathered to describe searching effectiveness of OPAC in Nanjing University Library from users' perspective. The *effectiveness of OPAC searching* is a multiple-choice question.

Table 3

Annual Reading Quantity	Completeness of Searching(%)	Accuracy of Searching(%)	Perfect Effectiveness(%)
<=10	29.48	72.91	15.94
10~50	26.07	71.89	15.55
>=50	20.73	72.73	13.82

Table 3 shows the result that categorized by user's reading quantity. Differences across reading groups were significant. Concerning with the completeness of searching, Data declined from 29.48% to 20.73% according to reading quantity. The more books users red the more problems they would find in completeness of information retrieval. The results indicated that respondents were not satisfied with completeness of searching in general. In the interview, some of them claimed that the searching result could not cover all the books that should be in it. There always be some books purchased by library, which could not be retrieved by OPAC.

The accuracy of searching was described quite the same by different reading groups. It was a little more than 70 percent(72.91%, 71.89% and 72.73%) of users who thought the accuracy of information retrieval was satisfied. The data showed the precision ratio of OPAC was fine, that meant, there were littlie irrelevant results presented when searching OPAC.

Perfect effectiveness meant there were no problems both in completeness and accuracy of information retrieval. The percentages of users who claimed the perfect effectiveness in searching were falling according to the amount they red. A little more than 15% of users whose reading quantity was under 50 reported the perfection of OPAC, while 13% of more-than-50 readers thought so. In general, most of users thought OPAC searching do have problems. It suggested that it was urgent to improve the quality of cataloging description and subject heading, so as to develop the OPAC searching effect.

	Table 4		
User Identity	Completeness of Searching(%)	Accuracy of Searching(%)	Perfect Effectiveness (%)
Undergraduate	25.72	73.49	17.85
Graduate	25.55	71.17	14.21
PHD Candidate	24.56	74.85	12.87
Professor	39.78	75.27	15.05

Results are also categorized by user identity, as shown in Table 4. Different from Table 3, there was no significant change regulation related to user identity. Percentages of Completeness were almost the same among undergraduate, graduate and PHD candidate, it was around 25 percent. Professors claimed obviously higher numbers. Since professor respondents were those who contacted with librarian usually, they were supposed to be very familiar with OPAC searching and library services. Consequently, there could be a little predetermined tendency to satisfaction of professors. The accuracy of searching was reported a little more than 70% by different groups. There were no obvious differences between each group. The percentages of users who claimed prefect effectiveness were dropping according to their identities, except that the proportion of professors was a little bigger since the same reason presented before. Comparing the results shown in Table 3 and Table 4, it seemed that data grouped by user identity did not change regularly as data grouped by reading quantity. Reading quantity was proved to be more reasonable as a factor to measure users than identity. Therefore, data presented in this paper are mostly categorized by reading quantity of users.

3.3 Finding Books in Open Shelves

Finding books in open shelves is the way that users could obtain the paper version of library collections. Books listing on shelves are organized mainly by classification. In Nanjing University Library, Chinese Library Classification is a basic shelving rule, which is very popular in academic libraries in China. Questions were designed to gather information from users.

● The first question invited general comments on the convenience of finding books.
● The second was to claim the longest time a user ever use to find a book.
● The third was about how usually a user supposed to be failed in finding books.

Table 5							
Annual Reading Quantity	Convenience of Finding Books(%)	The Longest Time of Finding A Book(%)			Fail in Finding Books(%)		
	Yes	1-5min	5-10min	>10min	Usual	Occasional	Never
<=10	37.45	11.16	41.43	47.41	21.51	66.14	12.35
10~50	40.07	9.93	33.85	56.22	26.20	65.19	8.61
>=50	45.45	13.09	28.00	58.91	32.36	62.91	4.73

Table 5 shows that nearly 50 percent (45.45%) of users who read more than 50 books a year claimed it is convenient to find books in open shelves, while percentages were under 40% when users reading books less than 50 annually. The more-than-50 readers were supposed to be very familiar with Chinese Library Classification. The results indicated that the more books a user red the more convenient he would feel about the classification. Percentages grew with reading quantity perfectly.

On the contrary, the longest time to find a book was much longer described by reading users than those who reading less. 58.91 percent of more-than-50 users claimed that they ever spent more than 10 minutes to find a book, while 47.41% of less-than-10 users had taken so much time. The familiarity could not help users to reduce the time they spent in finding books. It suggested that books were not classified as good as it looks like, or there must have been some problems in shelving.

It was interesting that the percentage of users who could find books within 5 minutes varied by reading groups. There were 11.16% of less-than-10 users, while 9.93% of between-10-and-50 users and 13.09% of more-than-50 users reported they could find books very fast. The results show that the effect of shelving supporting by classification varied according to different user's demands. Those who red less than 10 books a year would come to find books in open shelf occasionally. 11.16 of them could find books within 5 minutes. This kind of respondents, when interviewed, said most of books they red were textbooks, exam reference material or books concerning their specialty. The data suggested that the effect of classification of this kind of entry-level professional books was better than the books concerning with user's deeply reading needs. Users reading more than 10 books a year spend times to find books according to their familiarity with the classification. More-than-50 users evidently took less time in entry-level books than the users reading less than 50 books a year.

The probability of failing in finding books increased with the reading quantity. The more books users wanted to get, the more chance they failed to obtain. 32.36 percent of more-than-50 users claimed that they failed in finding usually, while only 4.73% of them had never encountered this situation. The fail chance was declining among those who red less. There had to be some problems in shelf listing. But shelf

listing is controlled by classification. It is the class number that decides which shelf a book belongs to. So the fundamental reason for users' fail in finding books is classification.

3.4 User's willing to participate

Since there do have problems in description cataloging, subject heading, and classification, which lead imperfect OPAC searching and open shelf finding experience. Library users could have not found books through library entries. In that case, what would they like to do is the point worthy of studying. The survey invited respondents to report what they do next after not finding books in library.

Table 6

Annual Reading Quantity	Borrow from Friends(%)	Other Libraries(%)	Search Engine(%)	Book-Review Website(%)	Online Bookstore(%)
<=10	11.68	3.78	53.96	32.32	4.82
10~50	8.90	3.38	53.77	74.99	25.00
>=50	5.82	4.11	56.73	72.36	43.18

The questionnaire listed five ways to get books as supplementary methods, see Table 6. Asking friends is absolutely not a main way to get books. Among those who red book less than 10 annually, reported a little higher percentage, which was 11.68%. When reading quantity increased, the percentage dropped. Asking other libraries for inter-library loan was also not a method that users got used to. The percentages among all types of respondents were less than 5%, besides, users with high reading quantity tended to borrow books from other libraries a little more frequently.

Search engine, as expected, was one of the most popular choices among respondents. Over 50 percent of all user reported search engine as a main entry to find books. Some of them claimed that they would like to turn to search engine even before searching in OPAC.

Particularly, the survey results showed that book-review website was also described as a main entry to find books. The proportion was 32.32% among less-than-10 users, 74.99% among between-10-and-50 users, and 72.36% among more-than-50 users. The percentages of high reading quantity respondents selected this option even more than search engine. In China, Doban Books[XI] is one of the most popular book-review websites. The book terms in Doban Books are provided by web visitors by Web2.0 approach. It presents book reviews, tags, interests-recommendations, and even original classification. Furthermore, Doban Books provides different ways to get books. It has a special web page area to show "Where to buy" which linking different online bookstores, and "Where to borrow" connecting several local libraries to help inter-library loaning. "Doban Books helps

me not only to identify the books I really need, but also to find and get it" said Yang Xin, a PHD candidate from department of Liberal Arts, aged 32.

Online bookstore, as a supplementary method to get books was welcomed by users who really read. 43.18 of high reading quantity users tended to buy a book when it could not be found in library. While respondents reading less were lacking in enthusiasm for online bookstore.

Data showed in Table 6 indicate that libraries are losing their users. They turn to Internet services when could not find books in library. However, the crisis is also a good chance for libraries to change themselves. What researchers interested is that when libraries would change, could users come back and join us to do something? Table 7 presents the survey results.

Table 7

Annual Reading Quantity	Wiki Cataloging	Tag	Book Review	Reading Record	Share with Internet	Connect to Online Bookstore
<=10	79.68	40.24	47.81	43.82	35.46	20.32
10~50	82.66	32.18	53.95	52.15	27.15	27.99
>=50	85.82	36.00	56.73	55.64	27.64	30.18

Most of the respondents wanted to do wiki cataloging in library website. Over 80 percent of users with high reading quantity reported that. Even among the users not reading so many books, 79.68 of them agreed to participate in cataloging.

Tagging is another typical Web2.0 application helping users to identify books. More than 30% of all respondents wanted to add personalized tag in OPAC. The tag needs were specially higher among less-than-10 users(40.24%).

Book review is very popular on Internet Web2.0 website, but it is not regularly employed by libraries. The demands of users were significant as shown in Table 7. Around 50 percent of them claimed that they would like to review books in library website. The needs were increasing along with reading quantities.

The option of "Reading Record" meant recording the books that a user having red, being reading, and willing to read. The percentages were also considerable. Over 50 percent of reading-interested users needed to record what they read. Even the users who have less reading interest, 43.82 of they had this kind of demands.

The need of sharing book information with Internet did not vary regularly. Data were around 30 percent. Connecting to online bookstore is a supplementary way to get books when library books are not available. The demands were reported differently by reading quantity groups. It was 20.32 among less-than-10 group, 27.99 among between-10-and-50 group, and 30.18 among more-than-50 group. Users with high reading quantity were more intended to spend money on books than others.

Data shown in Table 7 indicated that users would like to contribute to library collection. They were enthusiasm for wiki cataloging, tag, book review and sharing

book information with Internet. It is a very good foundation that librarians improve their services together with users.

4. Discussion

As mentioned in the *introduction*, cataloging is a powerful bridge connecting users and books. It is one of the operations during library workflow. Although cataloging dose not facing users directly, it interferes with user experiments substantially. This study addressed the results of a recent survey of Nanjing University Library users to explore searching and finding books patterns from user's perspective. Several findings emerge from the analysis, each of which will be discussed in turn.

First, the effectiveness of OPAC searching reported by users was not satisfied as expected. Fewer than 30 percent of respondents claimed the completeness of information retrieval. The percentages declined from 29.48% to 20.73 when reading quantity increased. The results of searching accuracy were much better. Over 70 percent of all users thought the precision ratio was fine. There were no significant differences between each reading group. The percentages of *perfect effectiveness* decreased according to reading amount. The more books users red, the less satisfied they were with OPAC searching.

Searching terms are provided by librarians through description cataloging and subject cataloging. Satisfactory precision ratio means that the description terms are very helpful. As we all know, great attention are paid to standard descriptive format by cataloguers in Chinese academic library. The problems claimed in recall ratio are probably related to subject heading, which are paid less attention. There always are books not showing up in relevant searching results. The reasons for the subject heading problems are, first, the long time working habits of cataloguers. They are accustomed to lay much emphasis on description other than subject heading. Subject terms given by cataloguers are precise, but not comprehensive enough to describe books. The second reason is that new vocabulary words emerges rapidly, especially the new expression on the Internet. The knowledge renewing of librarians could not keep pace with the rapid change. Therefore the rich connotations of books could not be comprehensively presented by the subject terms addressed by catalogers.

Second, finding books in open shelf were claimed to be convenience in general by all kinds of users. Nearly 50 percent of more-than-50 readers who were much more familiar with classification than others believed so. But at the same time, around 50% of users ever spent more than ten minutes to find a book. It is difficult to find books in the current shelf listing based on Chinese Library Classification, Especially the books related to deeply reading demands from users who really read. The more books users wanted to get, the more chance they supposed to fail, claimed by 32.36% of more-than-50 users.

Shelf listing is ruled by classification. It is the class number that decides which shelf a book belongs to. The survey results indicate that classification needs to be further

improved. In recent years, the development of subjects in various disciplines has shown a diversified feature. The numbers of interdisciplinary books has increased. It becomes more and more difficult to decide which subjects a book belongs to. On the other hand, librarian with limited major background could not classify all the professional books in the appropriate stage. Furthermore, there is no feedback control from users to amend classification. Librarians are not supposed to retrospect when classification is finished. Once a wrong class number is distributed to a book, it will become a "dead" book which could not be found forever. It is a huge waste of resources.

Third, since users are not satisfied with library services, they turn to public website. Search engine is the usual entry to resources, more than half of users reported it. Book-review website was another popular supplementary way to find books, claimed by over 70% of users who are interested in reading. On the Internet, search engine, book-review website, and online bookstore are related closely to helping patrons discovering resources. Web2.0 approach is frequently used as methods to improve user experience by feedback control and user participation. The problems existing in OPAC searching and classification in library are all solved by public web services. To find, select, identify and obtain items seems to be easy on the Internet.

But library is the original place where users begin their academic activity with. If libraries are inclined to change themselves, users do want to come back and contribute, as shown in the survey results. Around 80 percent of users described that they would amend book terms by wiki cataloging. About 50% of all respondents would review book in OPAC. Nearly 40% were inclined to add tag. And all kinds of users expressed that they expected to share information between library and internet.

The data analysis indicates that there exactly is a gap between users and cataloging. The users' feedback cannot reach cataloging process, which is really needed for cataloging control. On the other hand, users do want to participate with library services. Then the question is why librarians have not done something to break the barriers to achieve a win-win? Based on intensively study, we found that it is the process design of current Integrated Library System (ILS) which prevents the cooperation between users and cataloging. Since the current ILS running in Nanjing University Library is a workflow-oriented system, as most of Chinese academic libraries. Workflow is the most important link which cannot be broken. Cataloging is one of the library operations that between acquisition and collection modules. Users' involvement in library workflow is only in circulation module, which is far away from cataloging. It is very hard to establish a channel to connect users and cataloging. The feedback from users is not easy to be used as valid data references. The contribution from users through Web2.0 approach is also difficult to be located in ILS. There are some practices addressed by several libraries to add Web2.0 application to OPAC. But it is not a fundamental solution, because it is not based on the architecture of ILS. The application will fall down when OPAC updated.

The most efficient way to solve the problems is to re-design the ILS through users-oriented architecture. The workflow has to be broken. Users should have to participate in all of library operations. The feedback control could help library to improve not only cataloging but also acquisition, collection, circulation and other operations. It will help library to discover resources from user's perspective, and also avoid a great amount of resource wasting.

5. Best Practice

The design ideas of system architecture have developed from Workflow-Oriented, Object-Oriented, and Service-Oriented to User-Oriented. Workflow-Oriented system lays emphasis on the continuity of process. Processes cannot be broken throughout the whole system, as most of the Integrated Library System running in Chinese academic libraries. Object-Oriented system encapsulates code and data aiming at reusing. Service-Oriented Architecture (SOA) is a popular design idea used in IT industry. SOA upgrades the package level comparing with Object-Oriented. At present, User becomes the center of focus on the whole Internet. User-Oriented Architecture comes true when Open-Platform is going to dominate the market. Open-Platform inherits the advantages of SOA. It is consist of loosely-coupled Applications (APPs) based on OpenAPI technologies. OpenAPI is an interface for Data, Application, or Resources following proprietary or general rules. It is provided by different sources, including Internet firms, public information institutions or even users themselves. There are several large-scale open-platform examples popular among Internet users, such as App Store from Apple, Chrome Web Store from Google, Windows App Store from Microsoft, and Q-Plus Open-Platform from Tencent. Internet manufactures are trying to control the user's entrance to Internet, occupying not only the World Wide Web but also user's desktop. It indicates that there is an innovation of information organization on the Internet at present.

With the purpose of combining users to library, ILS should be designed through Open-Platform —— A User-Oriented architecture. The internal structure of Open-Platform is presented in Figure 1.

**Figure 1 Open-Platform——A User-Oriented Architecture**
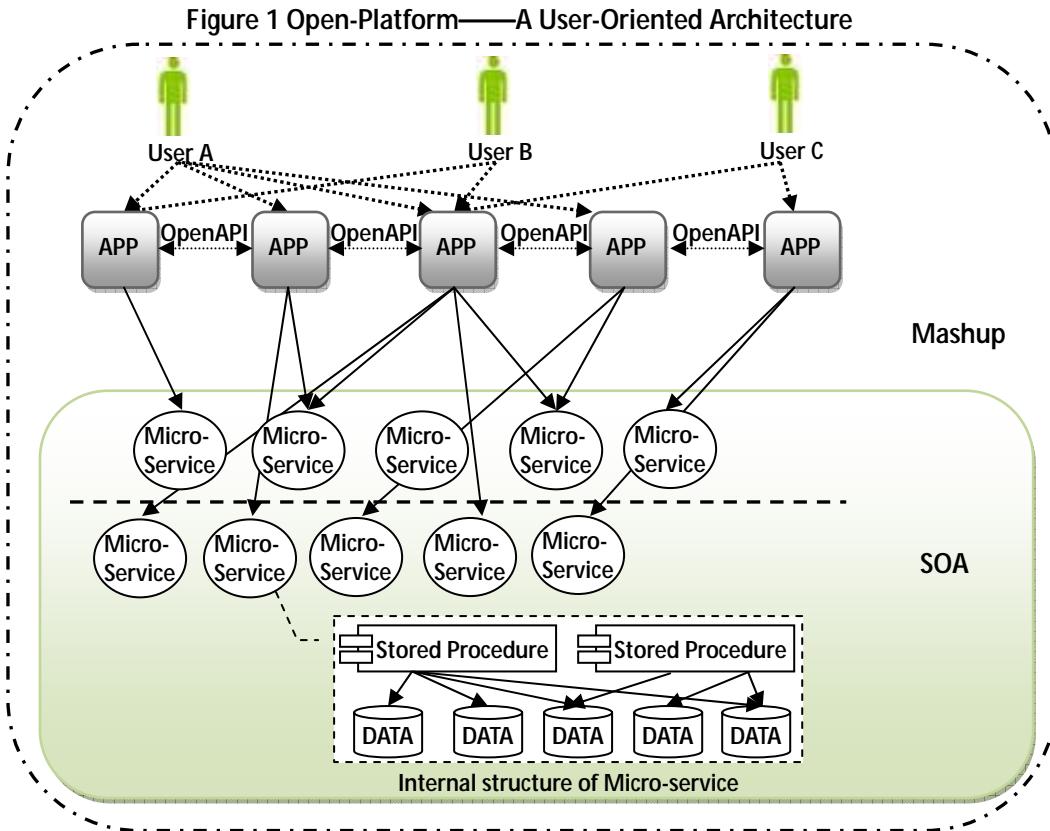
Stored Procedure and related Data are packaged as Micro-Services, which is basic component of SOA. Micro-Services are loosely-coupled. They are easily to be composed together through standard protocol of data transmission. [XII] The composition of Micro-services produces Apps, in which certain functions could be realized. Apps are directly facing users. It is users who decide which App they would like to call. The advantages of Open-Platform are that,

1) User becomes the master to dominate applications. The barrier between users and resource providers are finally broken.
2) The internal structure is encapsulated strictly, which are beneficial for the re-using of applications.
3) Since the loosely-coupled and easily-recomposed mechanism, Open-Platform could change effectively according to users demand.

This study addresses User-Oriented Architecture to re-design the Cataloging Module of ILS as an experimental attempt. In order to bring users and librarians closer together, we try to find a way to solve the problems exiting in current ILS. The internal structure of current cataloging module is shown in Figure 2.

Figure 2　Cataloging Module in Current ILS
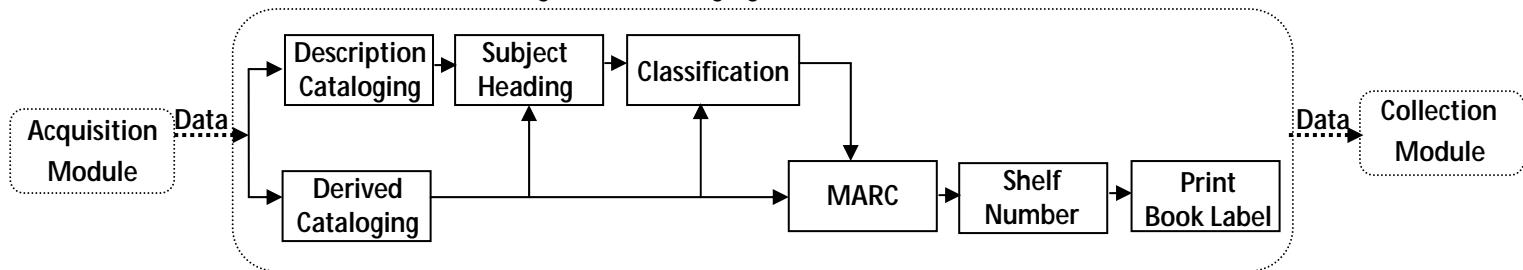
Data are transmitted from Acquisition Module. There are two way of cataloging. The first is original cataloging, the main steps of which are description, subject heading, and classification. The second is derived cataloging. Book terms can be derived from several website in China, such as CALIS, JALIS acquisition and cataloging center. Derived terms have description, subject, and classification. If librarians are not satisfied with the term, they would go back to original cataloging process. Finally MARC records are formed, then shelf numbers are assigned and book labels are printed. At the end of cataloging process, data are transmitted to Collection Module.

To re-produce Cataloging Module through User-Oriented Architecture, the operation process is broken as a whole. Functions are designed as Apps composed of Micro-Services. See Figure 3.

Figure3　Cataloging Open-Platform
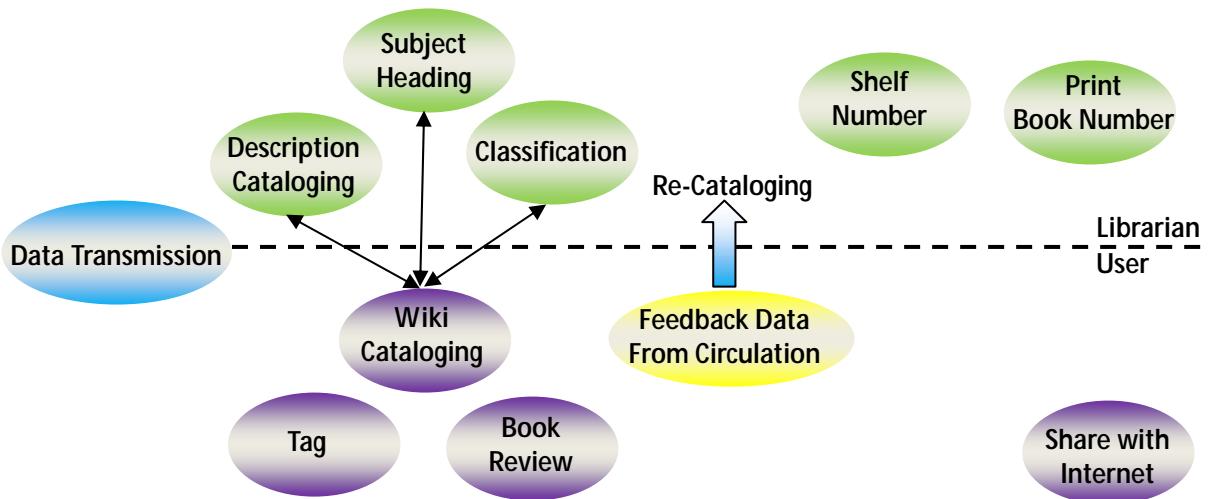
In cataloging Open-Platform as shown in Figure 3, traditional cataloging operations are presented above the dotted line. Description, subject and classification are formed as Apps independently, so as Shelf number assignment and book number printing. User's contribution Apps are under the line. Wiki cataloging could help to amend resource terms in each part of cataloging, including description, subject and classification. It solves the problems mentioned in the *Discussion* that subject and classification could not be flawless because of the limitation of librarian's major background. Furthermore, wiki cataloging can be conducted not only by users but

also by librarians, even those who are not engaged in cataloging. As supplementary Apps, tags and book review will fill the connotation that the traditional cataloging cannot express. The participation of user is greatly encouraged in the cataloging Open-Platform.

Feedback data from circulation are also designed as an App helping to retrospect MARC record. The improper description of resources could be reflected from statistical data. "Dead books" should be returned to the operation and cataloged again. Therefore there are data stream circulated around the Apps. The catalog control from user feedback will be smoothly conducted. It is an effective way to avoid resources wasting in library. All of the valuable information could be shared with the Internet. The connection between library services and Internet services could be related more closely than before. Library would not serve as an isolated information island outside the Internet any more.

Since the loosely-coupled feature of Open-Platform, it is convenient to re-compose Apps. The process is not obliged to complete as a whole. Various Apps could be selected by users or librarians according to their demands when producing catalog. By avoiding the unnecessary procedure, the efficiency of cataloging is improved. Furthermore, when new demands arising, new Apps could be added to Open-Platform easily to the architecture, which is superior to current ILS greatly.

The results of this research indicate that there is a gap between users and cataloging from the users' perspective. The effectiveness of OPAC searching and finding books in Open Shelf is not satisfactory. The cataloging operation conducted in current Chinese academic libraries prevents users from participating and contributing, which library really need. Since the enthusiasm of users willing to involving, the fundamental solution to solve these problems is to re-design the ILS. Open-Platform, which based on User-Oriented Architecture, has great advantages as shown in the practice experiment. It has been proved in public Internet services already.

The Gap Between Users and Cataloging

——A Description and Analysis of Survey Data in Chinese Academic Library

Zhai Xiaojuan
Nanjing University Library
China

USER → SEARCHING → DESCRIPTION → BOOKS

SEARCHING → SUBJECT → BOOKS

USER → FINDING → CLASSIFICATION → BOOKS

AQUISITION → CATALOGING → CIRCULATION
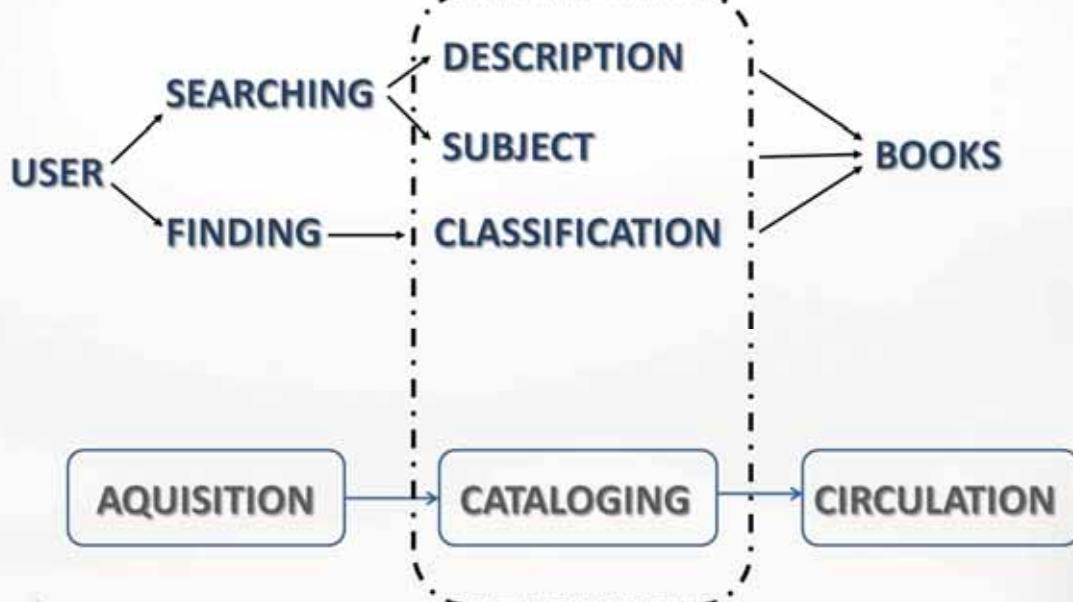
Significant Differences of This Study

- ➢ Chinese Library Users

- ➢ Academic Library

- ➢ The Latest Data

- ➢ A New Measurement

- ➢ From the Users' Perspective

Three Entry Points

(1) OPAC Searching

(2) Finding Books in Open Shelves

(3) User's Willing to Participate and Contribute

Sample Collection

Nanjing University Library of China

Onsite

Face-to-Face

Survey Results

A total of **1,362** results gathered

The Response rate is **76%**.

A New Measurement

Annual Reading Quantity
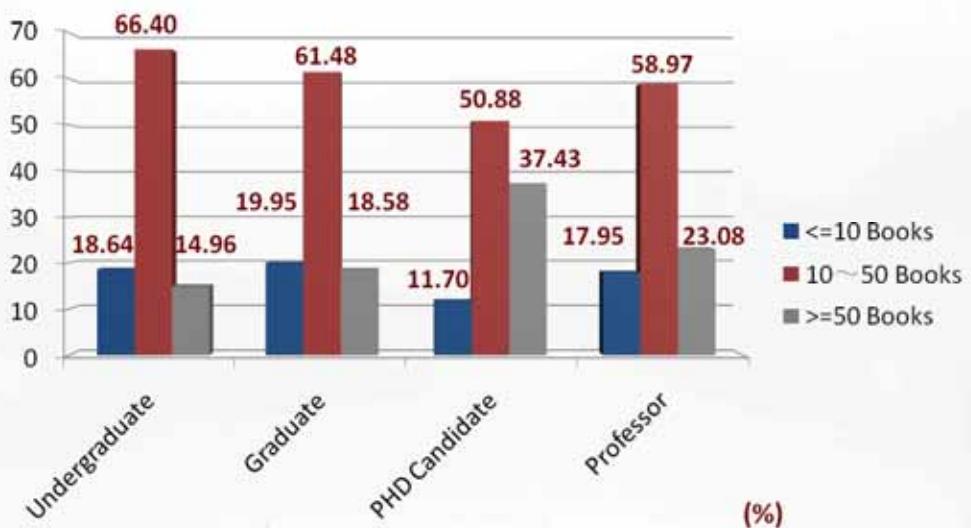
**Effectiveness of OPAC Searching**
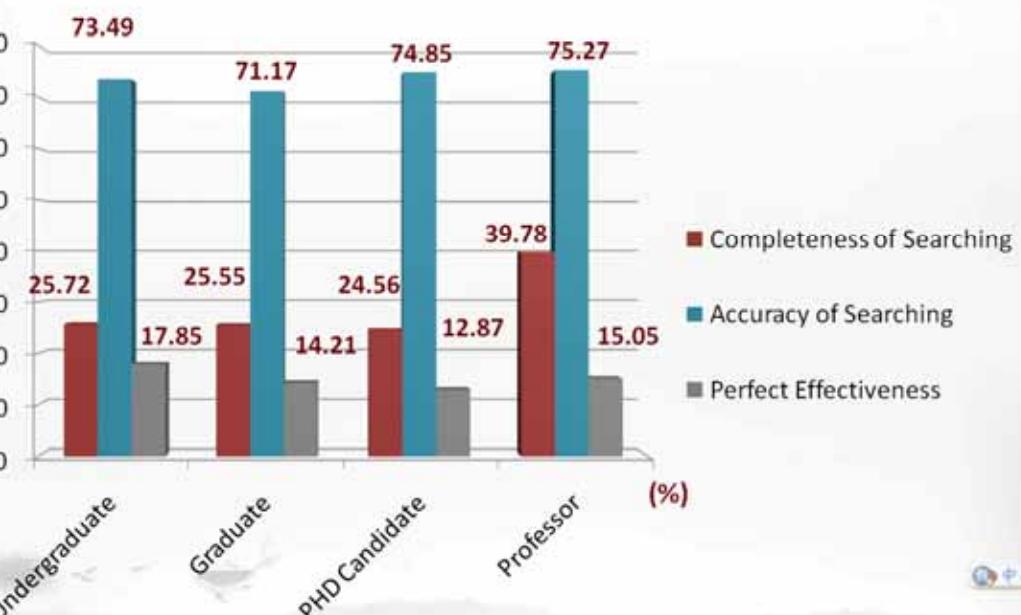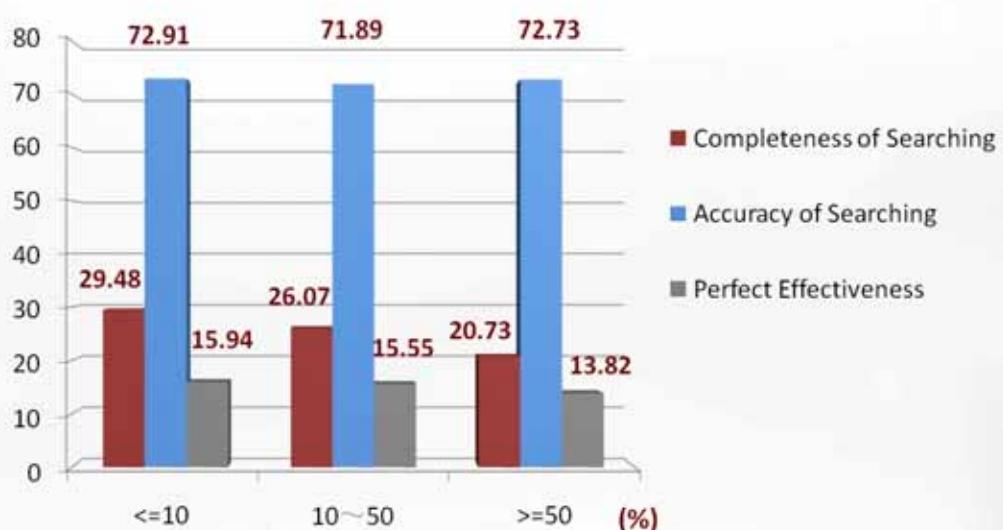
Finding Books in Open Shelves

Convenience of Finding Books in Open Shelves
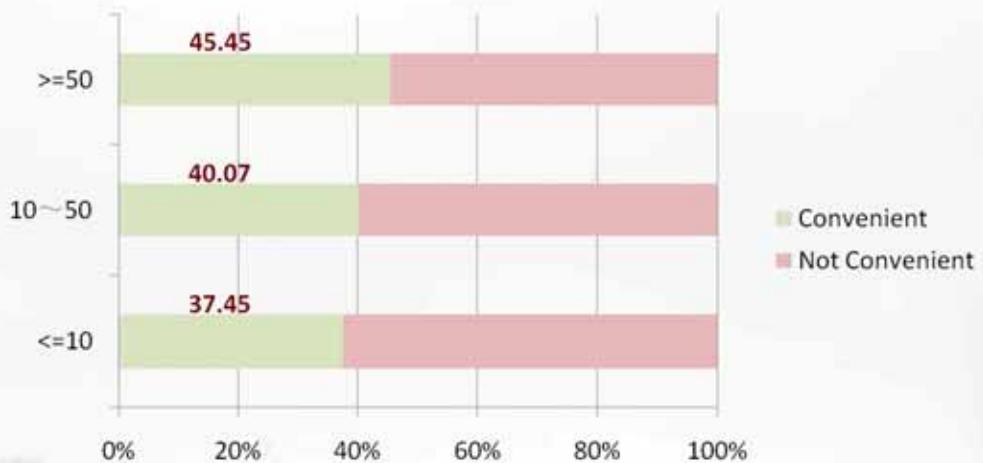
The Longest Time of Finding A Book
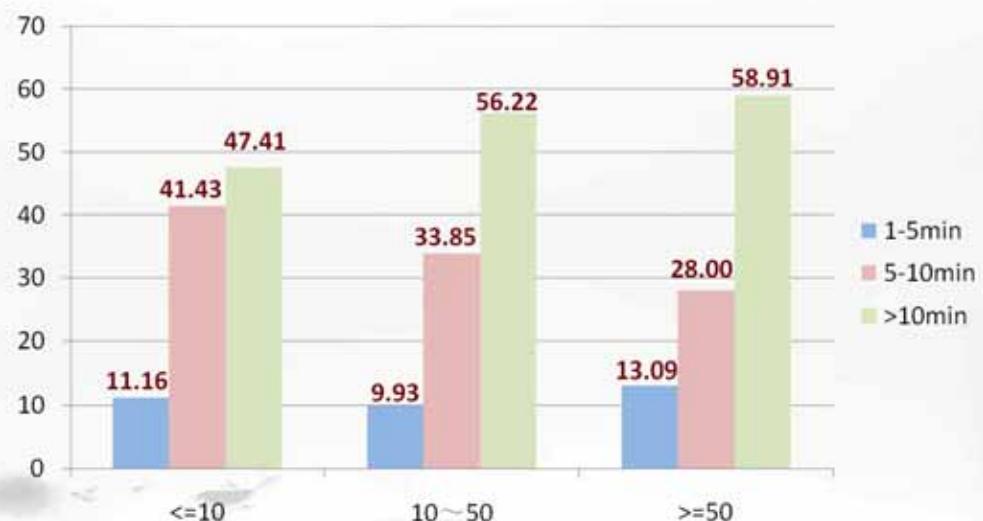
Fail in Finding Books
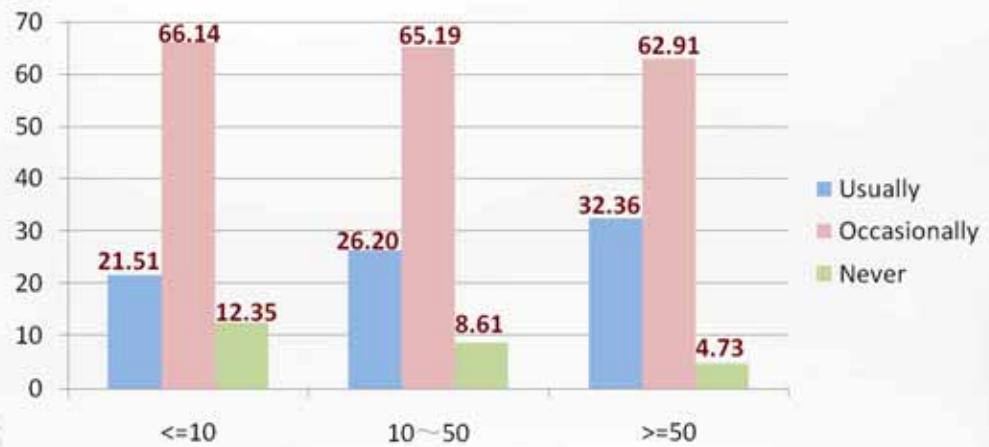
Users' Willing

The Supplemental Way of Finding Resources

	Borrow from Friends(%)	Other Libraries (%)	Search Engine(%)	Book-Review Website (%)	Online Bookstore(%)
<=10	11.68	3.78	53.96	32.32	4.82
10~50	8.90	3.38	53.77	74.99	25.00
>=50	5.82	4.11	56.73	72.36	43.18

User's willing to participate

	Wiki Cataloging (%)	Tag (%)	Book Review (%)	Reading Record (%)	Share with Internet(%)	Connect to Online Bookstore (%)
<=10	79.68	40.24	47.81	43.82	35.46	20.32
10~50	82.66	32.18	53.95	52.15	27.15	27.99
>=50	85.82	36.00	56.73	55.64	27.64	30.18

Conclusion

➢ There is a gap

——The fundamental reason

➢ There is a chance

——The fundamental solution

Best Practice

Best Practice

Workflow of Current ILS
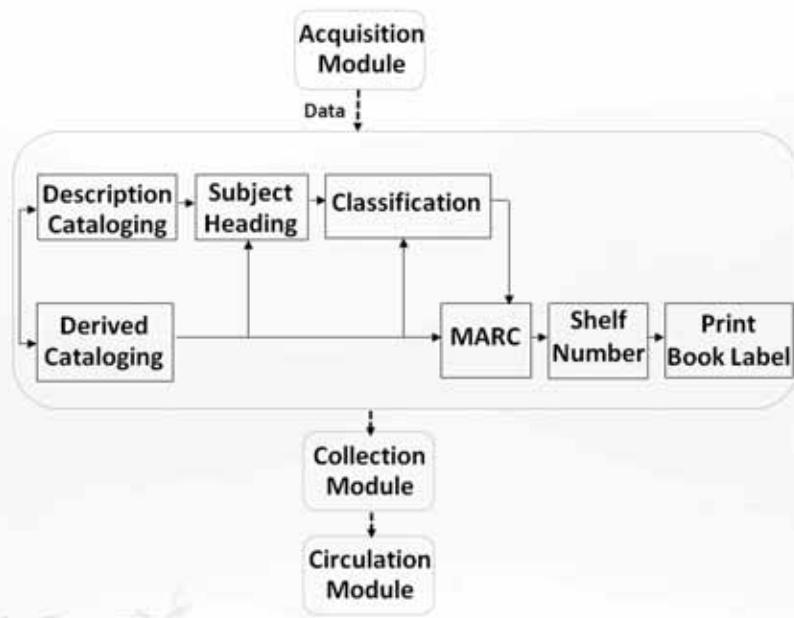
Open-Platform —— A User-Oriented Architecture
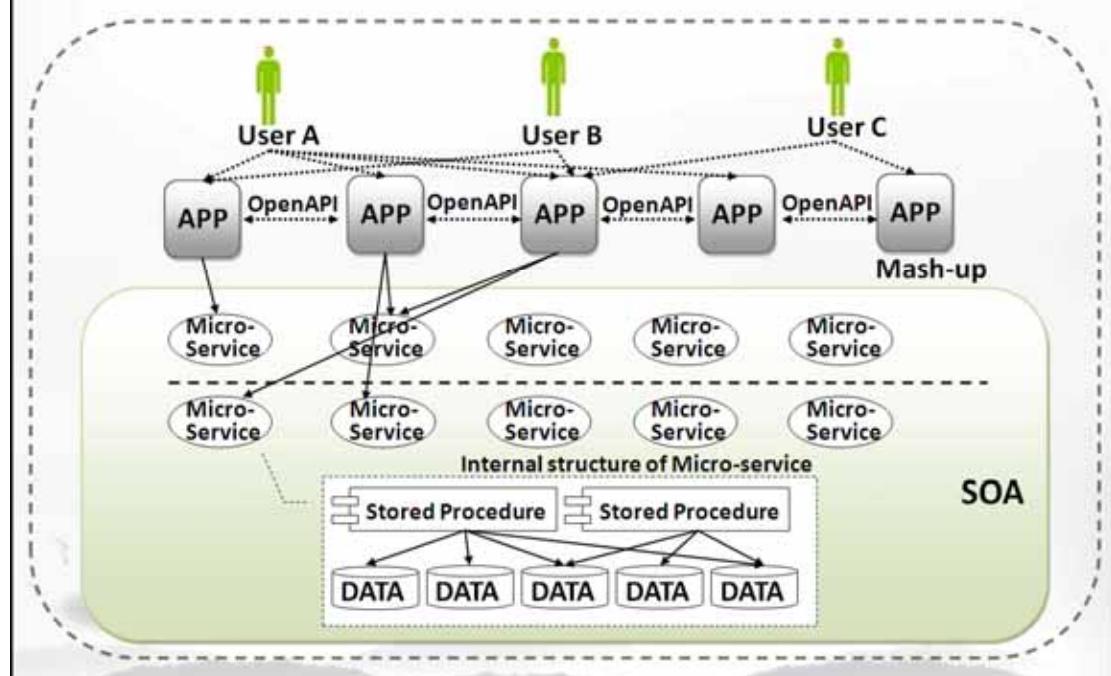
Cataloging Open-Platform Model
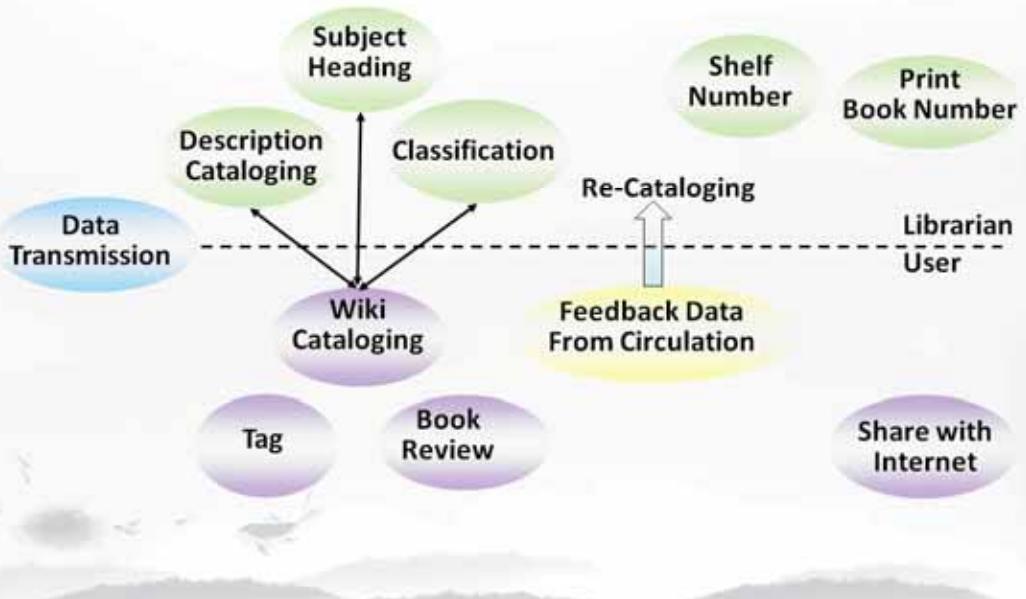
Thank You!

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Acknowledgement

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