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Review

Development of Mobile Phone Culture in Japan and Its Implications to Library Services: Prospecting Information Services in Coming "Ubiquitous Society"

わが国における「ケータイ」文化の発展と図書館サービスにおけるその意義：ユビキタス社会での情報サービスを展望して

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ABSTRACT

Prevalence of mobile phone capable of the internet access in Japan since its first service in 1999 is so remarkable as to be proudly denoted in the Information and Communications White Paper of the government, and a new adaptable culture or life style is being created. In this environment, the internet access to library catalog databases by mobile phones has been launched at several libraries. The paper surveys general situation on the mobile internet access with an emphasis on functionality and applicability of mobile phone to the every aspect of the society. Then it discusses the implications of mobile access to the whole library services in a "Ubiquitous Society," for which the government is enthusiastically formulating and promoting its policies in these years.

要旨

わが国におけるインターネット接続可能な携帯電話の普及は、1999年の開始以来めざましく、情報通信白書もこれを誇らしげに語るに至り、新しい文化、生活様式も生まれている。こうした環境下、携帯電話による図書館目録データベースの検索利用も数館において始まっている。本稿では、社会の各側面に対する携帯電話の機能性、適用性に特に注目しつつ、携帯インターネット接続の現状を総覧する。その上で、昨今政府が精力的に政策の形成、推進を図っている「ユビキタス社会」における、図書館サービス全般に関わるモバイル・アクセスの意義について考察する。

[Keywords]

ubiquitous society, mobile phone, internet access, library catalog, library service

[キーワード]

ユビキタス社会, 携帯電話, インターネット接続, 図書館目録, 図書館サービス

1 INTRODUCTION: PROGRESS OF IN-FORMATIZATION IN JAPANESE SOCIETY

Japan has a long history of computerization since around 1965, when IBM released the 360 series computers applicable to business applications in industry. A boom of MIS (Management Information Systems) took place in

Japanese business world and a mission composed of the business leaders was sent to USA in 1967. They convinced that applications of computers to all the aspects of business process should make the society far more efficient and convenient. Thus computers were vigorously introduced to Japanese businesses and including banking, manufacturing and also for government.

Prior to the boom there had been active discussions on the future of information related industry like mass-media, TV having been the focus of the discussions. As is generally known, macroeconomics of information has begun with the study on "Knowledge Industry" by Fritz Machlup in 1962. In the same year, a Japanese famous ethnologist, Tadao UMESAO published a paper with the title "Information Industry," where he characterized broadcasting industry as selling informational commodity and pointed out uniqueness of information as an economic product.^[1] He says that the word, "Information Industry" is his invention.

This type of discussion was carried out together with those on the civilization at computerized society and the types of studies were much developed in Japan as discussions on the "Informatized Society." Here, we devised the word, "informatization" rather than computerization more than 30 years ago in order to depict broad influence which computer and telecommunication technology would bring to the society. The national government of Japan has been promoting the informatization by designating the first week of October, "Informatization Week," since 1972, and various types of events have been held in the week every year. Its catchphrase for year 2002 was "Ubiquitous Society," where we again devised a new word by broadening the mean and scope of application for the original concept, "ubiquitous computing." As is touch upon later, studies on the influence of popularization of mobile phone to the society are vigorous today as a part of discussions on the ubiquitous society, succeeding to the stream of studies on the informatized society since 1960s.

The author made a report in 2002 on the present situation of application of the mobile internet access to library services in Japan.^[2] In the present paper, in view of the rapid developments in technologies and culture for the mobile phone, the author is going to discuss the implications of prevalent mobile internet access or ubiquitous networking to library services, which should impose libraries fundamental innovation in their services.

2 PREVALENCE OF MOBILE INTERNET SERVICES

2.1 Penetration of Mobile Internet

According to the Information and Communications White Paper 2002 by the Japanese government, internet

penetration among Japanese people is showing a remarkable advance in these years.^[3] Japan is now the second biggest country after USA in terms of the internet population. However, in terms of per capita popularization, Japan is still at the 16th with some 44% of people accessible to the internet. However the white paper appears to be proud to state that Japan is the most advanced country in the world in "mobile internet," the internet access through mobile phones.

The mobile internet, started in February 1999 by NTT DoCoMo's "i-mode," got more than 50 million users within 3 years, and now has 60,946,100 contracts as of February 2003. The rate of internet capability in mobile phones has reached 72.3%, which is the top of the world with Korea of 59.1% as the 2nd, followed by Finland of 16.5%. The USA is ranked at the 6th with that of 7.9%. In this wireless telecommunication environment, various types of services and businesses are being developed in Japan including ticketing, banking, image downloading, positional information service, etc. The white paper itself is publicized through mobile internet in a specially formatted version as well as the normal version for PCs. Thus all the people and organizations in the society including libraries are naturally involved in the world of mobile internet. The author sees the influence and implication of mobile internet to libraries should be discussed with special attention, as they play important roles in information distribution in the society.

2.2 PHS, the Forerunner of Mobile Internet

The internet connection via mobile phones has been in existence for years where the phone was connected to PCs through modem function, and thus the transmission speed is quite low as 9600 bps. The other problem for this type of connection was its high cost, because the charge is based on connection time. Thus this type of usage could not get popularity as a matter of course.

PHS (Personal Handy Phone System) was originally developed in 1995 with the aim of providing users cheaper mobile phone, using ISDN network as the base with smaller investment for constructing cellular stations.^[4] PHS was unexpectedly become popular among high school students in around 1997 due to their low cost, though it could be used only in urban area and in low speed mobile scenes like walking. Due to this shortage

PHS were losing customers along with the cheeping of fees of usual mobile phones. PHS companies changed their target to internet connection based on its advantage of a high speed transmission of 32k / 64k bps. They developed a new way of digital data transmission on PHS, "PIAFS (PHS Internet Access Forum Standard)" in 1997, and intended to attract business users rather than high school students. PHS companies are selling PC card type devices suitable for PCs and PDAs for internet access. There are several mobile PCs with a built-in PHS function. Thus the period had lasted for a while until i-mode appeared in 1999, that mobile phones were only for oral communication and PHS for internet access.

PHS operators now appears to concentrate their energy upon increasing data transmission speed up to 128k bps and fixed fee plans with unlimited connection time which are quite fitted to internet access. PHS has an advantage that the handset runs at low electric power, which makes them smaller than usual mobile phones. NTT DoCoMo recently announced a wrist watch type handset capable of internet access, showing a direction of PHS for the wearable terminal. The other characteristic of PHS is its narrow area of about 300m diameter covered by a cellular station. This makes positioning the handset more accurate, and PHS operators is providing the "positional information contents" around you such as traffic information, shops and notification of your location to your friends. Thus PHS is finding its way of developments distinctive to usual mobile phone.

2.3 "i-mode" or the First Internet Access via Mobile Phone

The i-mode, the first mobile internet service, is a method to access the internet from mobile phones developed and operated by NTT DoCoMo since February 1999.^[5,6] NTT (Nippon Telegraph and Telephone Corporation) began the car phone service in 1979, when it was a public corporation, and released a pocket-sized handset in 1991. NTT established NTT DoCoMo as a subsidiary specialized in mobile telecommunication in 1992 with prospect of expanding mobile phone market. The "i" of i-mode stands for internet, information, interaction and I, myself. On an i-mode phone you can access to the internet by just pushing the i-mode button on it (or the icon on the display) and you will see the i-mode menu prepared by

NTT DoCoMo. The menu includes e-mail and various information providing sites, and you will be able to e-mail or exchange information by selecting those menu items. The information accessible through the i-mode menu is provided by the companies and banks (information providers) in association with NTT and those sites are called the "Official Sites." The official sites can operate fee based services where the fees are collected by NTT DoCoMo together with usual phone charges.

Ordinary web sites are also accessible by specifying URLs. But due to the small screen of mobile phones, customized web pages are needed for their practical use. NTT DoCoMo announces that the number of the official sites is 3,435 while the number of general or voluntary sites dedicated to i-mode is 63,415 as of February 2003. Some 48% of i-mode accesses are for the official sites and the rest goes to general sites. The typical profile of a user shows that he or she receives 5.1 mail messages, sends 3.9 of them and looks 9.0 web pages a day.

When the i-mode first appeared in 1999, information specialists were quite skeptical of its future because the screen on the phone was so small as to display only 48 Japanese characters (96 alphabets) and the ten-key system is considered so poor for input Japanese characters. However, contrary to the predictions, the i-mode has very rapidly become popular mainly among young people. Several reasons are assumed to its success. NTT DoCoMo set a comparably low price level to communication charges and also for information charges for information providers of the official sites, which was fairly affordable by young people. Here the i-mode should be noted as it had realized a micro-payment system and had proved its practicality in information services.

Concerning the ten-key pad operation on mobile phones, young people had already got the skill in their high school age, when they were using low cost pagers for communication among friends. At that period mobile phones were so expensive for them. The pagers can display characters sent by callers who input them using a ten-key pad on public phones. Young people have acquired the fast inputting skill on ten-key pads while they were exchanging messages through pagers. As the next step PHS became popular among them, and they used the PHS short message services, where again ten-key input operation was

heavily involved. The i-mode phones are usually operated only by a thumb. Now the youth adapted to i-mode operation, showing very fast keying with a thumb on the phone, are called *Thumbelina* or *Le Petit Poucet* (Little Thumb) by older people after fairy tales by H. C. Andersen and Charles Perrault.

3 KEITAI-LOGY OR CULTURAL STUDIES ON MOBILE PHONE

3.1 Possibility of Keitai-ology

Because the mobile internet service by NTT DoCoMo proved to be successful, all the other carriers followed it, that is, EZweb by "au" and TU-KA (KDDI), and J-SKY by J-PHONE (now owned by Vodafone).^[7,8] This made mobile phone further prevalent in our society, and now mobile phone is usually designated with a shorthand "*Keitai*" meaning "portable" by omitting the second word of *Keitai-Denwa* or portable phone in Japanese. As mobile phones appear to be affecting the life style especially for young generation, there are appearing many publications dealing with this societal phenomenon from various aspects including sociology, economics, business, government reformation, etc. as well as telecommunication technology, in addition to a number of specialized magazines for young i-mode users.^[9-13]

A stream of those discussions or studies is composed of the media study as a part of sociology, and analyzes characteristics of Keitai as a communication medium, new types of human relation realized by Keitai and a new culture resulted by popularization of Keitai among people. Here the method of analyzing the current fashion devised by Wajiro KON in 1923, "Modernology," can be applied. Modernology as opposing to archaeology observes and records fashion and customs of people walking on the high streets, intending to document ongoing societal phenomena. The methodology is quite similar to the field work in sociology, and sociologists together with armatures who like watching things and people on the road have developed the studies in this area. Now a number of modernological studies on the Keitai culture have been published, one of which is bold enough to declare the establishment of "*Keitai-ology*" as a new field of science.^[12]

3.2 Unique Culture Created on Original Technology?

Some researchers claim that Keitai culture particularly among young generation is unique to Japan, and its uniqueness is augmented by the technology originated in Japan. They say that uniqueness of the Keitai culture when compared with the other ones among young people is that it has originally been developed in Japan, while young people generally tend to think that all of the fashionable items must come from USA like jeans and hamburgers.^[12] However the author can not fully agree to this view, because we see the other examples of this sort in comics, animation pictures and karaoke which has been registered in the American Heritage Dictionary of the English Language as it is in Japanese, indicating its popularity worldwide.

There have been discussions on originality and creativity of Japanese for many years in the country, and now the faction appears to be dominant who maintain the lack of originality in Japanese, as should be proven by the long economic recession of today in Japan. The line of discussions also criticizes i-mode technology because it is originally designed by NTT and thus incompatible with the Western standards which should be the global standards. Regarding those debates, the author sees that the long-pending and acute antagonism between the self-torture view and the self-respect view of the nation's history itself is the very uniqueness of Japanese culture, when we recall several changes in superiority between the two fractions along with the national economic cycles in the history.

Anyhow, the Keitai culture definitely has a great influence to behavior of people of all generations including elderly people, and also businesses and governments throughout the country not only for their informational activities but for their whole life. The phone companies are releasing types of handsets suitable for the elderly with larger keys and letters, simplified functions and also text-to-speech function for reading e-mail. This would confirm the widened applications of mobile phone covering the entire society, and the Keitai culture might be said quite unique to Japan for the moment.

4 EVOLUTION OF BROWSER PHONE AND MOBILE INTERNET ACCESS

4.1 Characteristics of Browser Phone

The mobile phones capable of internet access are now generally called browser phones, because they are equipped with a larger screen fitted to browsing web pages (Note that "Browserphone" in a single word is a registered trademark of NTT DoCoMo). For the first i-mode phone, the screen was small as to display 8 (16 for alphabets) x 6 characters and was monochrome. The newest model of 2003 has become to have a QVGA resolution display (240 x 320 pixels) which is capable of displaying 18 (36) characters x 17 lines with 256k colors.

Table 1 depicts a comparison among browser phones, PDAs and mobile PCs. Here we can see that browser phones have the advantage in built-in telecommunication function where the users do not have to worry about preparation for internet accesses. They will be provided with the internet and a e-mail address by just buying a mobile phone. Contents / access fees are automatically charged to the telephone account. In the market there appeared some PDAs and small PCs with built-in PHS accesses functions. However they are not capable of usual telephone function, so you would have to carry both a mobile phone and a PC. Thus browser phones have become quite popular and now simple mobile phones with only telephone function are disappearing in the market. Mobile phones are now synonymous to browser phones capable of internet access.

Browser phones are also equipped with java virtual machine and the memory size is enlarged and also processing speed is increased more and more. Free or charged java applets (they are named "i-appli" in the i-mode system) can be downloaded and run on your phone. So far games have been the dominant applications, but the area is being widened to include practical or business oriented ones. Thus browser phones become much closer to PDAs and

PCs.

It should be noted here that Japan had a long history of PDAs since before the word appeared in 1993 with Apple's Newton. Around 1985, the manufactures of pocket calculators were expanding their function to be capable of memorizing addresses and schedules, and a company put a type of them on the market with the name, Electronic Pocket Notebook in 1987. Electronic pocket notebooks, now called PDAs, soon became popular among business people, and today we see the many advanced models among business persons.

Nevertheless, browser phones have become far more popular among people beyond business use. One of the reasons could be attributed their bundled or packaged way of sales. As is described above, browser phones are sold with the contract with a particular telephone company, and you will be immediately connected to the internet just by getting one. Thus mobile phone carriers are continuing to develop new models capable of new services to differentiate each other. Another reason of the popularity might be its orientation to entertainment attracting young people rather than business or practical use. Though we now see various practical services on the mobile phone today as follows, based on its wide coverage of generations, the driving force in the early stage should be attributed to its orientation to entertainingness.

4.2 Evolution of Mobile Phone Functions with the Digital Camera

In this trend, many companies are establishing information services specialized to browser phone accesses. The interesting one among them is the download services of melodic ringing tones which notify telephone calls. Users can download their favorite song for their ringing tone, and change it periodically. The browser phones are competing with their capability of playing polyphony to make the rings more musical. Since 2002, these ringing tone services has been expanded to involve actual voice mes-

Table 1. Comparison of Browser Phones with PDAs and Mobile PCs

Terminal type	Screen (dots/chars)	Input device	Telecom interface	Weight
Browser phone	240 x 320 (18 x 17)	ten-key pad / digital camera, image scanner	built-in telephone	100g
PDA	320 x 320	touch screen / hand writing recognition	PC-card interface for modem / Ethernet	200g
Mobile PC	1024 x 768	full keyboard	modem / Ethernet	1kg

sages, where you can download voice messages by famous talents telling you a call arrival. Those messages are switched automatically depending on the caller's telephone number by setting a collation table in your handset. The function has again expanded to include hit songs by actual singers, and you will be able to listen to new releases when you got a call or mail. Wall paper download service is among the popular services, in which you can get wall papers of animation characters with periodical changes for the display on the phone for your entertainment.

The photo transmission function is another function which has made browser phones further popular. It is realized by the browser phone equipped with a small digital camera. With these phones, you can take a photo and send it immediately with your voice or mail message to your friends. Now the function is being enhanced so as to send semi-motion pictures, realizing something like a TV telephone system. Photo function is evolving to include business oriented services beyond the simple entertainment by using the built-in digital camera as the image scanner.

Typical application using digital camera on the phone as image scanner is to read and register addresses into the phone. A 2-dimensional bar code printed on business cards representing the name, address, e-mail address, URLs, etc can be read by the camera and the data would be instantly registered in the address book in your handset. This type of business cards are expected to help salespersons and the software to print the cards with bar codes is on the market.

4.3 Mobile Phone as an Electronic ID and Electronic Purse

Application of the 2-dimensional barcode to mobile phone is expected to include utilization of the phones as personal IDs and electronic purses. As barcode readers capable of reading 2-dimensional barcodes displayed on the phone screen have been developed, the applications of mobile phone are expanding to various types of business scenes covering sales of physical goods beyond informational products.

The forerunner of this type of business is that of purchasing canned drinks on vending machines by browser phones jointly developed by NTT DoCoMo and Coca Cola in 2001, in which you can buy drinks by showing your phone to a specialized vending machine. The ma-

chine is equipped with an optical reader, and it detects a barcode displayed on your phone screen, identifying your account. Thus you can use the vending machine as the deposit machine like ATM at banks and also vending machine not only the drinks but also various types of products. For the moment, the system includes i-applications downloads and ticketing services in which you can get a theater ticket instantly printed at the machine. The function of the mobile phone and the vending machine for the system has expanded to include infrared communication besides barcode recognition.

The barcodes downloaded and displayed on your phone can be applied to authorization process in various types of services. NTT DoCoMo has started the service where you can pay monthly telephone charges at a convenience store where the cash register capable of recognizing your invoice displayed on the phone screen in a barcode format is installed. Those IDs or vouchers on the screen can also be accepted by human clerks when they are displayed in a human readable format such as the case that the ticket on the screen is checked at a theater entrance instead of paper tickets. Those ticket-less systems or electronic ticket systems has already been experimented and are in the process for regular services.

In summary, mobile phones have become the tiny and all-in-one PCs equipped with a display, a keyboard (keypad), a digital camera / scanner, a microphone, a speaker, and also wireless telecommunication function. In addition, they have an authorization and accounting system built-in, which should make various types of new businesses possible. The applications of mobile phone appear to include a wide range of services, not only for information services but also for various types of commodity sales. The e-commerce via mobile phone and the new business models are the topical theme for a range of companies.^[6,13]

4.4 Mobile Internet Services and Markup Language Compatibility

As is shown in Table 2, the i-mode of NTT DoCoMo started the first internet access service through mobile phone and is still dominating the market. The other telephone companies followed NTT DoCoMo with the other distinctive services than i-mode's. It is noted that the photo transmission service was first developed by J-PHONE in November 2000, not only remarkably improving its posi-

tion in the market but also making mobile phone much more popular. NTT DoCoMo was late in this service, and started it at length in June 2002.

There exists incompatibility among markup languages adopted in mobile internet services: i-mode (NTT DoCoMo), EZweb ("au" and TU-KA), and J-SKY (J-PHONE). Their characteristics are compared in Table 2. As the standards are incompatible with each other, the server sites have to establish the three kinds of homepages fitted to each of them. W3C has formulated a simplified version of XHTML suitable for mobile phones (XHTML-basic or WAP2.0), and EZweb adopted it from 2002. NTT DoCoMo also adopted WAP2.0 in its 3 generation mobile phone handsets, FOMA, put on the market at the end of 2002. Thus WAP2.0 is expected to lower the incompatibility among mobile internet services.

5 APPLICATIONS OF MOBILE INTERNET TO LIBRARY SERVICES

As is surveyed in the above, potentiality of the internet capable mobile phone system is huge so as to give impact on various types of businesses especially on information services and information related industry. Libraries are among them which are positively finding their way in the new environment with the notion that the mobile phone would be one of the major communication tools between libraries and users. Informatization of library services has a shorter history since around 1980 than that of industry and banking because the library catalogs mainly consist of data in Japanese language for Japanese materials, and computer technology to easily handle Japanese had not been developed until around 1980.^[15] However the progress was remarkable since then and now we see a number of libraries are installing the mobile internet access to

OPACs (Open Public Access Catalogs) as is described here.

5.1 "i-mode OPAC" or Mobile Access to Library Catalog Databases

The first application of i-mode to OPAC services is developed at Toyama University Library in September 2000.^[16] One of the conditions for the development is the high popularity of mobile phones among students. A survey by the university for its students in 1999 showed that more than 90% of them owned mobile phones, most of which were browser phones. Thus the mobile phone was considered an effective communication tool between the university and the students.

By that time, some universities had begun news services of administrative affairs like cancellation of classes, where students could know the news in their home before coming to the campus. Those news services could be realized fairly easier than library applications, because they only include a small amount of short messages, which could easily be accessed by a simple menu system with straightforward cursor movements on the phone. In library applications, database retrieval like OPACs should naturally be included, and this requires special developments to cope with the small screen and input process with the ten-key pad on browser phones. Thus many of the libraries who service mobile accesses were providing only news and guides for libraries excluding catalog related information services.

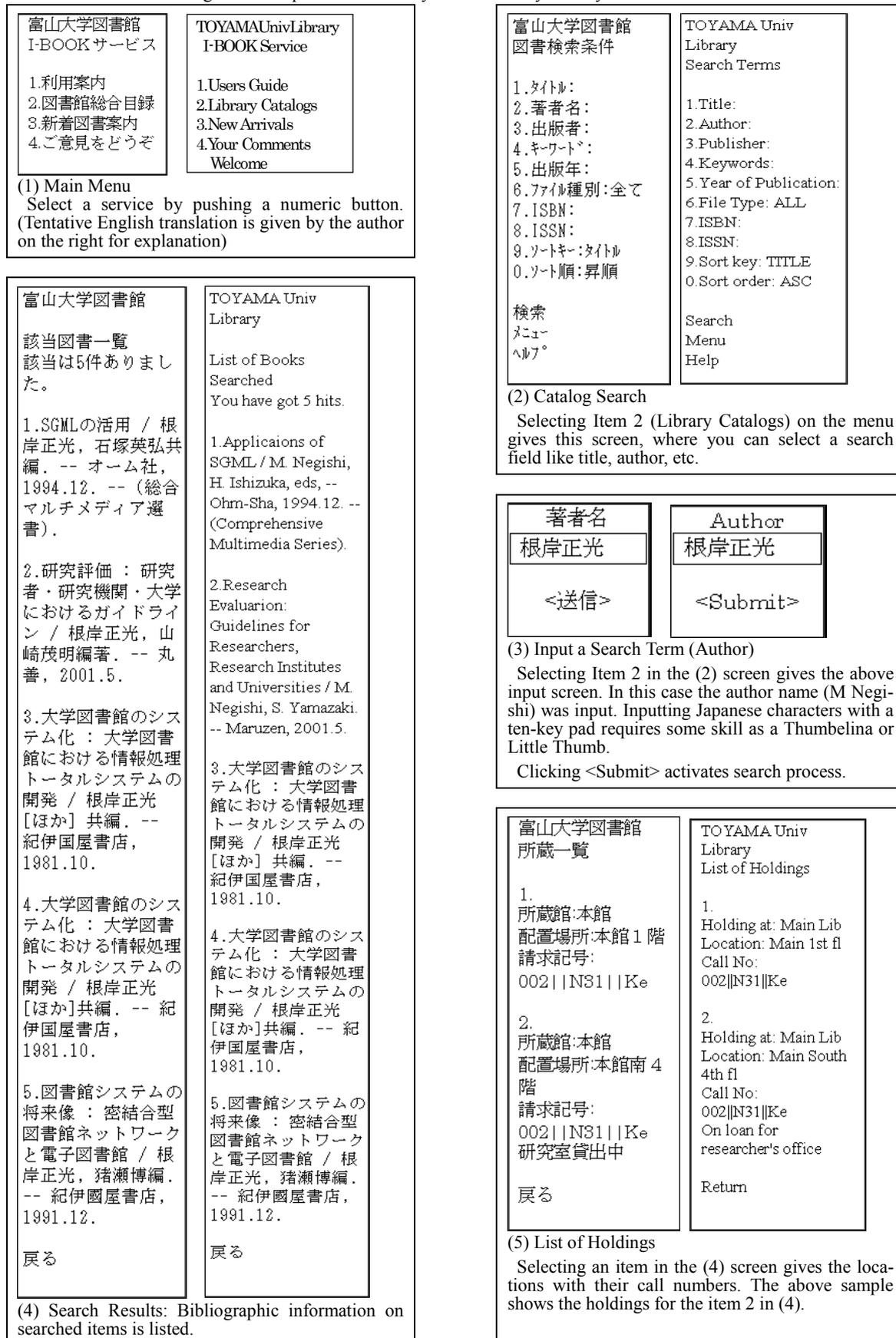
5.2 Toyama University Library I-BOOK SERVICE, the First i-mode OPAC

Figure 1 depicts the menu and sample screens of Toyama University Library's I-BOOK SERVICE or the first OPAC service accessible via mobile phones.^[16] As is

Table 2. Market Shares and Markup Languages of the Three Mobile Internet Systems

Service	Number of Users as of Feb 2003 ^[14]	Markup Language	Characteristics
i-mode (NTT DoCoMo)	36,931,000	C-HTML (Compact HTML)	A simplified version of HTML designed by NTT
EZweb (au, TU-KA / KDDI)	12,131,900	XHTML-Basic (now switching from HDML: Handheld Device ML)	WAP (Wireless Application Protocol) based
J-SKY (J-PHONE / vodafone)	11,883,200	MML (Mobile ML)	Similar to C-HTML designed by J-PHONE
Total	60,946,100	(Total users of mobile phone with and without internet access : 74,368,600) (PHS users: 5,490,900)	

Figure 1. Sample Screens of Toyama University Library I-BOOK SERVICE



found in the references at the end of paper, the library prepares three web sites corresponding to the three mobile internet systems in Table 2.

5.3 Utilization of i-mode OPACs

Tokyo University Library who operates the i-mode OPAC since May 2001 after Toyama University is publicizing the access statistics.^[17] According to them, there have been some 17,000 accesses to the i-mode OPAC by February 2003, that is, less than 800 accesses a month in average, while the accesses to the ordinary web-based OPAC is 470,000 a month. The counts for the i-mode version are still regrettably low when compared with those for the ordinary version. However we should expect their improvement by incorporating the other services such as book reservation and reference inquiry as is touched upon later. Moreover, we can expect the future development of functionality of browser phones including the size of screen and transmission speed, which would make the access to library services more comfortable and convenient.

5.4 Spread of Web-based OPACs and Supporting Services to Make Them Compatible with Browser Phone Access

According to a survey by JLA (the Japan Library Association), 637 public libraries out of 1645 in total have web-based OPACs as of March 2003, and quite a number of them are assumed to accept accesses from mobile phone.^[18] The number is expected to increase to cover all of the libraries in coming years in the light of prevalence of mobile phone among general public of the country.

Along with the spread of mobile internet and the need to establish mobile access compliant web sites, software products have been developed which automatically convert the contents designed for usual PCs into the ones formatted for the small screen of browser phones. As the techniques for those products are improved, the costs to prepare web sites fitted to mobile access on the top of the conventional web pages will be minimized.

Another solution for the need is to utilize ASPs (Application Service Providers). We have several software companies which have begun the services of mobile access systems for libraries as ASPs. They provide specialized gateways which connect libraries' OPAC databases and users' browser phones. In this type of services, no addi-

tional work is required at the library, as all of the data conversions from catalog databases to mobile compliant data are done at the gateways. Thus libraries are being encouraged to have mobile internet services for increasing mobile users.

5.5 Future Direction of Mobile Access in Library Applications

Mobile access to library services currently includes general guides, news and OPACs. According to the JLA survey of the above, some 170 public libraries operate web-based reservation systems. The number showed a remarkable increase in the last year, suggesting that web-based services are becoming quite common at libraries. The survey also shows that 50 libraries accept inquiries via e-mail in their reference service. Although e-mail could cover almost all the communications between libraries and users, it appears inefficient for routine services at libraries. For users with mobile phone, inputting long texts for the mail with the ten-keypad is another problem. Thus, well formatted communication designed for mobile phone should be desirable both for users and librarians.

In view of the popularization of mobile internet access in the country, various types of information services including library services through the internet might rather be targeted to mobile phone than accesses via conventional PCs. The function of mobile phone as the ID card would be another area of development where the browser phones are effectively applied to library services such as admission and lending.

6 LIBRARIES IN A UBIQUITOUS SOCIETY

6.1 e-Japan Strategy

The Japanese government established the "e-Japan Strategy" in 2001, in which the society with the ubiquitous information network was put in the agenda.^[19] The program aims to make Japan the most IT advanced country in the world in 2005. The history of the governmental initiative of this sort goes back to 1994, when "Advanced Information and Telecommunications Society Promotion Headquarters" was established within the Cabinet, with the prime minister as the chief. In light of the internet penetration, the government enacted "Basic Law on the Formation of an Advanced Information and Telecommunications Network Society" (IT Basic Law) in 2000, and

"Strategic Headquarters for the Promotion of an Advanced Information and Telecommunications Network Society" (IT Strategic Headquarters) was established in 2001.^[20] The e-Japan Strategy and e-Japan Priority Policy Program are the products by the headquarters.

In the strategy, Japan is going to establish a world fastest network, and on this infrastructure, e-commerce, electronic government and IT education are to be promoted. In its background, there is the notion that Japan is delayed in the internet utilization, and this is a cause for the economic recession of the last decade. The e-Japan strategy is one of the important political measures toward the economic recovery. However, it was very ironical that the IT bubble of USA collapsed in 2001, the year the IT Strategy was formulated, and the naive or intentional admiration of the New Economy brought by IT has swiftly gone down. The government reportedly is now revising the strategy to shift its priorities from infrastructure construction to utilization or application of IT for businesses and consumers. Anyhow, counter measures to worsening deflation and restoration of national competitive power would be the top targets in the new strategy. Here, the internet access through high speed mobile phones would be assumed to be the key factor, because Japan is leading the area from view points of technology and business.

6.2 Libraries Responding to Ubiquitous Access

Irrespective of the national economic difficulties, the year 2002 shall be memorable as the first year of the broadband era in Japan. The number of ADSL subscribers reached over 5 million at the end of 2002 and continues to increase at a high rate. The year 2003 may be the first year of FTTH (Fiber To The Home) era as electric power companies have entered the market and NTT is going to reduce the price for the competition. Regarding public wireless LAN services, NTT subsidiaries have begun the service and some other companies like ADSL providers and railway companies are making experiments expecting a large market. The 3rd generation mobile phone service (IMT-2000) was launched in 2001 and 2002 by NTT DoCoMo, au (KDDI) and J-PHONE with the transmission speed of 144 or 384 kbps. Centrino recently released by Intel is a topic in the area as it includes wireless LAN function making PDAs nearer to browser phones. Thus the high speed connections for consumers are being realized

both in wired and wireless areas.

Library services are facing a dramatic change brought about by digital contents, as is typically represented by the rapid progress of electronic journals. On the other hand, the network to connect users and libraries is becoming faster and literally ubiquitous as described in the above. In response to those changes both in contents and telecommunication, libraries should fundamentally redefine their future functions and services to attract users in the upcoming ubiquitous society. The access via mobile phone which is continuously evolving with the users' needs should be regarded as one of the most important factors in formulating the innovative library services in the future.

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