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Setsuko Noguchi

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DIGITAL ARCHIVES AND CONTENTS IN JAPAN: NEW TECHNOLOGIES, TRENDS, AND ISSUES

Setsuko Noguchi University of Illinois at Urbana-Champaign

Introduction

The concept of digital archiving of content has attracted attention in Japan since the mid-nineties as part of the radical development of technology. In particular, the widespread use of the Internet has encouraged digitization of images in open access archives by Japanese museums, and archives have increased significantly in recent years.

In January 2001, the Japanese Government established its "e-Japan strategy" aiming "...to be the forefront IT nation by 2005." To implement this strategy, three government ministries—the Agency for Cultural Affairs, the Ministry of Economy, Trade, and Industry, and the Ministry of Internal Affairs and Communications—have each set goals related to support of academic institutions, museums and archives, and industries in their Information Technology plans. Creating digital archives is a part of the "e-Japan strategy" and is the aspect of IT which the government most emphasizes.

In 1994, 40% of Japanese museums and archive administrators recognized the term "digital archives," but only 10% of them were considering building their own digital archives collections. By 2001, 80% of Japanese museums and archives had considered or planned to create digital archives. This data shows how rapidly digital archives have spread and how readily the concept has been widely adopted among Japanese museums and archives. In 2003, 29.4% of museums and archives had already built up respectable digital collections.[1] When we look at the current status of digital archives in Japan, it is most easily recognized in two broad divisions: in local archives and museums, and in academic institutions. Often local museums and academic institutions in the same region work collaboratively to create shared digital archives.

Based on the background above, I will present the general organizational aims and collection-building focus of digital archives in Japan. I will then examine digital archives in terms of usability, metadata, and database design, and discuss issues that face these archives currently from the results of the survey.

1. Overview of current Japanese digital archives

Digital content can be categorized into two types: tangible and intangible. Historical manuscripts, maps, and works of art are tangible, whereas dance, theater, and folk songs are intangible. As will become apparent in this discussion, academic libraries tend to digitize their collections, and predictably, local museums show more interest than academic institutions in archiving intangible contents in order to preserve their local history and culture. In the following paragraphs I will explain Japanese digital archives by discussing the approaches of organizations that focus on these two types of digital contents, tangible and intangible.

1-1. National libraries, museums, and archives: collecting tangible cultural assets

As of middle of 2007, the National Diet Library (the Japanese equivalent of the United States Library of Congress), two national archives, four national museums, and three national art museums have digitized their collections with cutting-edge technology, and stand at the forefront of current Japanese digital archive creation. The National Diet Library, the library of the Japanese Diet and the repository of all kinds of publications originating in Japan, has created two major digital collections. The Kindai Shogazō Database holds 45,000 pictures of early-modern Japan, and the Kindai Digital Library as of October, 2007 includes about 97,000 titles of publications from early-modern Japan. The Japan Center for Asian Historical Archives,[2] a branch of the National Archives of Japan,[3] has created the foremost digital collection and has mounted successful digital exhibitions after thorough experiments with

innovative technology. The National Archives of Japan launched its Digital Archives Systems in 2005 to provide digitized images of official records including cabinet meetings, and the Digital Gallery to offer images of public records, maps and photographs. In addition, the National Institute of Japanese Literature[4] provides two digital collections with advanced technologies to read Japanese manuscripts.

1-2. Local museums, libraries, and archives: cultural preservation

While academic libraries have digitized their unique and valuable collections, prefecture archives and local museums tend to digitize not only archival documents, but also intangible materials such as oral history, folk music and dance, in order to preserve their local history. The Science Council of Japan[5] submitted a recommendation to the Japanese government in 1969 for a law regarding the preservation of historical material, and submitted a further recommendation for an archival law in 1980. Accordingly, the Japanese archival law was established in 1987 in order to preserve official documents as historical documents in local archives. Since 1999, the Ministry of Internal Affairs and Communications has implemented building local digital archives in Japan.

Consequently, local governments have encouraged local museums and archives by appropriating funds to preserve their historical records, maps, regional traditional art, folk entertainment, dance and music in digital archives. There are 48 prefectures and metropolitan governments, which are locally self-governed in Japan. As of February 2006, 29 of the 48 prefectures have prefectural archives, and 12 of the 29 have published their digital collections online. 45 of the 48 prefectures hold some digitized archives in their local museums and libraries, 21 prefectures have published their digital collections, and 7 or 8 prefectures are planning to digitize their archival collections. Between 2003 and 2006, 13 of the 48 prefectures and metropolitan governments held workshops, seminars, and conferences regarding establishment, advertising, and maintenance of their own digital archives.

The most active organization of digital archiving during the last three years was the Kyōto Digital Archives, which recently merged with ASTEM (Advanced Software Technology & Mechatronics Research Institute of Kyōto)[6] and has taken on the ASTEM name. Their primary activity is collecting archival images, industrial records, traditional dance, theater, and music, including Kabuki, Noh, as well as folk songs and dances in the Kyōto area. Ritsumeikan Daigaku (Ritsumeikan University), which is located in Kyōto, has been working collaboratively with this digitization from the beginning.

Ritsumeikan Daigaku has also written grant proposals for this activity and received funding from the Japanese government's 21 Century COE program, under the jurisdiction of the Ministry of Education, Culture, Sports, Science and Technology (Center of Excellence 21).[7] In addition, one of the divisions of this digitization program at Ritsumeikan Daigaku is collaborating with the digital archive collection at Cornell University in the U.S., primarily in information exchange.

Another remarkable example of local prefectural archives is the Okinawa digital archive,[8] which is also digitizing images of landscapes, as well as recording traditional arts, folk songs and dances that accompany their unique history.

1-3. Academic Institutions

As is the case in the other countries, Japanese academic institutions, especially long-established universities, often hold valuable historical materials, such as manuscripts, arts, and maps in their libraries. To preserve these materials, academic institutions in Japan began to create digital archives as a part of their library collections much earlier than local museums and archives. This movement has revitalized libraries with a new function in addition to their traditional role as the providers of information resources to scholars.

In 1999, the Ministry of Education, Culture, Sports, Science and Technology established the 21 Century COE program in order to rebuild and revitalize Japanese universities and colleges and to encourage them to become creative and globally active in the pursuit of excellence. Successful proposals from Japanese universities and colleges receive yearly grants from the Ministry of Education, Culture, Sports, Science and Technology. In 2003, twenty proposals in the humanities received funding. Three of these included the creation of digital archives in their project plans. Due to this competition among public and private universities and colleges to introduce advanced technology into their proposals and

programs, the overall excellence of the academic institutions has improved. The coming years will surely show the total impact of this government grant system.

Waseda Daigaku (Waseda University) launched its Digital Campus Consortium (DCC)[9] in 1999. Through industry-university cooperation this has developed to create new educational models nationally and internationally. DCC has focused on establishing cyber college networks and creating contents for on-demand courses. Keiō Daigaku (Keio University)'s Humanities Media Interface (HUMI)[10] focuses on digitizing their rich rare collection with multiple avenues of research such as technological analysis, information management, and fair use.

1-4. Business involvement in digital archives

Beyond local governmental and academic digital archive collection, however, the involvement of the business community in archive creation is an important aspect of digital archive creation in Japan. Other forms of popular culture digital contents, such as popular video games, comics, and animation also have attracted peoples' attention long before the creation of digital archives by academic and local historical organizations. Digital content industries, such as Dream Technologies, Inc., have been involved with those activities, and the overall expected growth rate for these digital content industries from 2004 through 2006 is projected to be 26 percent, with projected revenue of one trillion yen ($10,000,000,000) in 2006. These industries have collaborated with local museums and historical archives to share their technologies. Behind-the-scenes collaboration and cross-fertilization undoubtedly take place between business interests and academia as well.

Software and hardware improvements benefit all, and rather than business interests competing with academic interests in the area of digital archive formation, business is more likely to cooperate for mutual benefit in community archive formation. For instance, in Aomori prefecture, Toppan, a printing company which is more than one hundred years old, collaborates with the prefecture in order to create a digital archive collection for Aomori prefecture's folklore arts. This is a prime example of business know-how benefiting the local community. There are several companies which help institutions and even individuals to create digital contents as well.

A good example of worldwide collaboration is Global Digital Museum (GDM)[11] which was developed by Tokyo Research Laboratory, IBM, Kokuritsu Minzokugaku Hakubutsukan (National Museum of Ethnology),[12] the British Museum, and Cornell University. GDM started a single virtual Museum in 1998, providing access to contents from multiple museums globally.

1-5. Organizations for digital archives

There are 31 organizations which appear in *Digital archives white paper 2004,*[13] and if one includes the Japan Digital Archives Association (JDAA), there are a total of 32 organizations involved in the creation of digital archives. These organizations exist to encourage the digitization movement both nationally and locally. Thirty of the 32 organizations are local, and five of them are Non-Profit Organizations (NPO).[14] All of the organizations have the common goal of archiving both physical assets, such as books and film, as well as intangible assets, such as dance, folk music, and other recordable performance arts. They seek to build an advanced information network system to send out these archives to organizations and individuals who wish to use them.

The Digital Frontier Kyoto is a spin-off organization from the Kyōto Digital Archive Kenkyu Center that began in 1999. Some of the other organizations are the Digital Archive Alliance, the Association for Local Digital Archives, and the Association of Media and Digital Contents (AMD). One of their common activities is to hold competitions to demonstrate technologies and also to encourage people to create digital content. The "Multimedia Grand Prize" and "Digital Contents Grand Prize" are sponsored jointly by the JDAA and the Ministry of Economics and Industries and have been held annually since 2000. The Digital Frontier Kyoto has awarded the "Digital Archive Award" since 2001. These contests solicit applicants internationally, and the "American Memory" online repository by the United States Library of Congress, as well as a significant collaborative achievement by the University of Virginia and the University of Pittsburgh, the "Japanese Text Initiative," have both been awarded the Digital Archive Award.

2. Innovative technologies and digital contents

2-1. Technologies for tangible and intangible contents

Academic libraries tend to digitize their print collections, and in comparison, local museums show more interest in archiving intangible contents in order to preserve local history and culture. The primary active and creative example of intangible archives is the Kyōto Digital Archive's Noh and Kabuki repository. Among academic institutions, Waseda Daigaku has published remarkable digital archives of theatre, and Ritsumeikan Daigaku and Cornell University have been collaborating to do research on preserving intangible materials. Hachimura Kozaburo and others of Ritsumeikan Daigaku have experimented with digital archiving for classical dance using optical motion capture that is searchable by physical action.[15] More developed technologies to digitize intangible contents have been urgently needed and have been developed rapidly in Japan, using animation and filming technology.

2-2. Intangible contents

Not only has the preservation of intangible materials made significant advances, but also several innovative technologies for tangible contents have been developed within the last two years in Japan. Recently, Kyūshū Daigaku (Kyūshū University) published its historical map collection with the collaboration of Dream Technologies, Inc.[16] When users right-click on the map, a pointer appears, and when the user drags the cursor, the map moves on the screen. Users can read maps smoothly just as if they were reading an actual map. This technology is very useful especially for scroll-type maps.

In early 2005, the Miyagi Museum digitized their archival collection with the aid of Dream Technologies, which uses the same pointer technology as Kyūshū Daigaku, but this collection also uses a new translating reader. When the user clicks the cursor on the cursive style Japanese character, the automatically translated modern font character appears. Since most Japanese-speaking users, with the exception of specialists, are not able to read the ancient cursive script, this function will be the most useful for general users.

2-3. New interface for manuscripts

At the Kyōto Daigaku Denshi Toshokan (Kyōto University Digital Library), there are two new versions of interfaces designed for reading original manuscripts, a glass-view interface and a split-screen interface, both of which are simultaneously-scrolling interfaces. Using these interfaces, users are able to read images of the original calligraphy of the manuscript and simultaneously scroll through the printed text. Both are new digital library technologies and very useful for users. Both are still in the experimental phase and not yet available online, but show great promise for researchers.

2-4. IC tag

A further important key technology is a micro tag called an IC tag that will be the next generation barcode. It is expected to be used in various industries, such as logistics, management, and publishing. In this network-based society, people will be able to access digital contents through car navigation or by cellular phone. In 2004, Kyūshū Daigaku Toshokan (Kyūshū University Library)[17] started using IC tags to identify and locate library materials. IC tags will be used in libraries for increasing workflow efficiency and reducing time and cost more effectively in tasks such as shelving and circulation. Ishikawa Prefecture and DNP (Dai Nippon Printing Co., Ltd)[18] introduced an electronic poster in about ten physical locations advertising a local event in 2005, and information pertaining to the event was delivered using IC tags and cellular phones. When users showed their IC tags to the poster, the IC tag reader incorporated into the poster identified users' IC tag IDs and sent their information to the mail server. Users were then able to retrieve detailed contents regarding the upcoming event via their cellular phones. Needless to say, IC tags are already changing Japanese daily life significantly. Japanese IT companies have been developing such technologies focusing on digital contents delivery for the next generation.

2-5. Cellular phone

It is well-known that cellular phones are not just used for spoken communication by most users in Japan, but are also used as email, Internet, and digital image retrieval devices. Since a winner of Akutagawa Prize, one of the most authoritative literary award, used his cellular phone to distribute his novel in 2000, numerous people distribute their online novels via cellular phone. For example, a high school

student sent in his novel using his cellular phone and was awarded a juvenile literary award in 2006. These phenomena happen because sending text messages via cellular phone is not an extra charge in Japan. Cellular phones will be used continuously as tools to retrieve digital contents, as the technology makes information available in a convenient format well-suited to the mobility of people in an industrialized culture. However, we need to be aware of security issues surrounding mobile networks as well.

I should also point out the usage of cellular phones in Japanese academic libraries and museums. In 2004, 70 Japanese universities and colleges offered links to their OPAC via cellular phone[19] and users are able to search OPAC, look at an item's status, and check their own accounts. Additionally, since most cellular phones in Japan have the ability to access the Internet and receive digital images, several phone companies and universities have been working cooperatively with technology to retrieve digital contents from the universities. For example, in mid-2005, Kokushikan Daigaku (Kokushikan University[20]) reported its success in downloading full texts from their library via cellular phone. This trend will grow quickly in the future.

3. Usage of current digital collections

Having finished an overview of current Japanese digital collections, I will now examine current digital collections on the web by looking at usage and accessibility issues. While I was surveying Japanese digital collections, I observed some common problems that illustrate particular issues in Japanese digital collections. I looked at a total of 56 web sites, of which 25 were academic institutions; 10 were of national archives and national museums; and 21 were those of prefectural archives and local museums which contain digital collections. I then examined their levels of accessibilities to the digitized materials, and usages of technology such as high resolution file type. As I predicted, several problems in navigation and design criteria were found to be particularly common in Japanese digital collections.

3-1. Webpage

When I looked for digital collections in each academic institution's website, 24 of 25 digital collections were located under its library as a part of library collections. Since libraries often do not appear in the Japanese academic institutions' homepages, it is not easy to find the digital collections. On the other hand, all digital collections in the national archives and museums, and 18 of 21 digital collections in the prefectural archives, local archives and museums, are found on their institutions' homepage. This is because for one thing the principles and functions of academic institutions and archives and museums differ, but also because libraries are not treated as essential assets in most Japanese academic institutions. This assessment of the importance of libraries in Japan needs to be discussed but is beyond the scope of this paper.

3-2. Database, index

I examined all 56 collections to see if there are any indices or databases for the records and images and to see if they are searchable. A total of 21 databases and indices were found in the digital collections, and 15 of them are searchable. 6 of the 21 collections provide only citations, and they are not searchable. Searchable terms in these databases are title, author, geographic names, and publication data, etc, if applicable. Most of the search engines are rather simple. For example, Boolean search is available in only 8 databases. However, it is notable that 5 databases provide multi-language search functions in addition to Japanese, in languages such as English, Chinese, and Korean.

3-3. File type and software

There were 7 Japanese digital collections in the academic institutions which require users to download viewer software. The types of software vary, and may take memory space in the end user's computer. It is also inconvenient for users who use networked computers and may have downloading restrictions placed upon their network by their institution's network administrator.

3-4. Links

Most of the internal links between digital collections and their homepages are connected, as well as the links between subsidiary digital collections and their institution's websites.

Some collections in the national museums and archives and prefectural archives provide external links to related sites that are relevant to the collections' purposes. Because national museums have been developing metadata to be able to search for data and images throughout the network of national museums, providing these external links is absolutely essential.

Hiroshima Daigaku (Hiroshima University)'s digital collection of Japanese picture books from the pre-modern[21] period provides relevant links from each book to the university's OPAC, related references, and bibliographies. This kind of thorough linkage will certainly be needed for digital collections, especially in academic institutions.

3-5. Description

A clear, adequate description of each item in a digital archive should be provided. Unfortunately, 3 of the 21 prefectural archives show a noticeable lack of description, although national museums and academic libraries provide well-written descriptions of their collections.

3-6. English as a common language

There are potential users around the world who would be interested in Japanese art, history and culture. Considering that English is the most frequently used language, Japanese recognize the importance of giving English speakers access to read and search in Japanese websites or collections. 11 of the 25 academic institutions' websites have English versions, but all of them are only for the top pages and none of them have English for their digital collections. Inner content is thereby rendered useless to non-Japanese speakers. None of the prefectural and local archives provide English versions. However, the Kyōto National Museum provides English descriptions from their homepage to each item in their digital collection. It would be very helpful for non-Japanese speakers if English descriptions were provided in Japanese digital collections, especially for artistic and cultural assets.

3-7. Design

There were 15 digital collections that contained pages that are not user-friendly for a variety of reasons: a) unclear navigation to other pages b) usage of unfamiliar terms to the general public (e. g., OPAC) and c) no instructions or descriptions regarding the usage of collections. Also, 11 digital collections do not provide thumbnails, and others require users to register and establish passwords to access the database.

3-8. Summary

It was found through the survey and examination above that although new technologies are recognized, usability and accessibility issues remain problematic among Japanese digital collections.
User surveys and web evaluation will help to solve these issues. In fact, some institutions, such as Japan Center for Asian Historical Records, have conducted user surveys and, as a result, their web pages have been improved significantly. A remarkable case in the academic sphere is the library web page guidelines proposed by a group of librarians and library school students and created by the Japan Coordinating Committee of University Libraries. Also, several web evaluation guidelines have been published and evaluation software is available. However, the recently-identified needed improvements and the results of the survey discussed above still indicates ignorance of the issues and the slow progress of organizational conduct and interaction.

4. Issues of digital archives in Japan

4-1. Budget, manpower, technology

Although the number of digital collections has increased recently, there remains hesitation about the decision to create a digital collection. It seems reasonable to think that the main reason for hesitation is financial. Digitization first requires educated manpower to recognize and to choose appropriate

historical and archival materials. Second, materials must be appropriately organized, and third, the material must be digitized with technology. It is obvious that national archives and museums have more budget and manpower to publish their rich collections with new technology. Without funding or sponsors, small institutions, especially local archives, are not able to create digital collections. As previously stated in the section regarding web accessibility, digital collections without databases or indices are the case in 12 out of a total of 26 digital collections. This shows that even though digitized archival materials exist, there is a lack of manpower—and perhaps finances—to create more useful collections.

Moreover, even though technologies for digitization are complex, nonetheless each institution uses different software. This points up the desirability of the development of software that can be used for a common purpose.

4-2. Copyright, privacy, personal history

Whenever institutions plan digitization of their collections, copyright laws should be considered first. Currently, most museums and archives tend to digitize cultural heritage and fine arts materials whose copyrights have expired. However, we will need to consider digitization of modern arts and copyrighted materials in the near future. In addition, unlike American copyright law, there is no comprehensive regulation of fair use in Japanese copyright law, except for limited usage in several enumerated cases. Hence there are some inhibitions to create digital collections due to the necessity of dealing with the complicated process regarding copyrights. In order to work out those issues, JDAA published guidelines for a digital archive copyright law and has organized workshops since 2000.

In addition, digitizing historical materials and public archival materials has been controversial due to individual privacy and security issues. For instance, would pictorial maps showing locations of a socially ostracized and historically isolated people be considered as an appropriate subject in a digital archive? There are arguments that publicizing archival materials would be the best resource to understand history, however securing privacy needs of the descendants of the isolated people must also be considered. Maps which list family names in specific locations could be used to discriminate against prospective employees or, indeed, marriage partners whose names or addresses correspond with those names or locations of the ostracized. The past reaches out to touch the present and that touch is not always benign. Okayama Prefecture Library has set limits for publishing certain materials which contain discriminatory elements, and Japan Center for Asian Historical Record has developed guidelines. In any case, great sensitivity to cultural issues is often required of the archivist in the decision-making process.

4-3. Creation of standard metadata

Establishing a standard metadata for digital archives among Japanese archives and museums has been discussed for a while. In March 2005 the Ministry of Internal Affairs and Communications submitted to the government a report on an experimental development program of metadata technology for networked cultural heritage information. The goal is to promote smooth and safe distribution of archival contents by creating established standard metadata sets. A total of 11 museums and archives cooperated in the program and its five sets of metadata: retrieval metadata, metadata for animated scenes, distribution control metadata, copyright metadata, and transaction metadata have been created and experimented with in the program. These metadata sets are supposed to be integrated with Dublin Core in order to secure compatibility for international distribution. However, the current Japanese bibliographic data system is not consolidated efficiently. For example, Japan MARC, which was established by the National Diet Library, is a complicated system and is difficult for international use. On the other hand, WebCat which is provided by NII, has a different system for its database and most Japanese academic institutions have participated in it. It is essential to harmonize these currently incompatible bibliographic data systems before attempting to develop a standard metadata for working with digital archives.

Conclusion

In Japan, we have a culture that focuses on small and detailed objects, and competes within itself as well as globally to create such objects with increasing accuracy. Digital archives have been rapidly developed because of this cultural trait, and with the government's strong support. However, there

are always two sides to traits. On the positive side, digital archives have changed academic research rapidly and significantly, and scholars have taken advantage of technology to conduct their research.

On the other hand, there are still unresolved issues, such as copyright law and privacy policies. Unless a clear concept of fair use becomes established in Japanese copyright law, Japanese digital content will be left behind or will sink into the ocean, a blow against the Japanese government's strategy to become the foremost IT nation. Correspondingly, clear guidelines for privacy policies will be needed. Otherwise, even if a standard metadata were to be implemented throughout Japanese digital archives, it would be ineffectual. We expect the Japanese government to give further consideration to these aspects of digital archives.

Since the late nineties, the notion of a ubiquitous network-based society has been discussed in Japan as an ideal network which can be accessed from anywhere, with the contents able to be shared by everybody. In this society, cellular phones will be used extensively as tools to retrieve digital contents, as the technology makes information available in a convenient format well-suited to the mobility of people in an industrialized culture. As a prerequisite to the goal of becoming ubiquitous, digital archives need to be prepared for seamless integration into global services. Japanese should bear in mind that the creation of digital archives in this coming world is made possible not only by advanced technology but also by taking a holistic view of digitization.

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