Information Systems at the National Museum of Ethnology

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1. Outline of the National Museum of Ethnology

1.1 General introduction

The National Museum of Ethnology (whose Japanese abbreviation is MINPAKU) was established in 1974 as an inter-university research institute, a system unique to Japan which was devised to promote cooperative research activities among national and private universities. Therefore, the administration and organization of MINPAKU are very similar to those of ordinary national universities in Japan, although the formal name of MINPAKU contains the word, "museum." The general functions of MINPAKU are as follows:

(1) Ethnological and anthropological research
(2) Public exhibition
(3) Collection and conservation of ethnographical materials and information

All these activities are conducted in cooperation with researchers of other universities, and occasionally researchers from abroad.

1.2 Ethnological collection, conservation, and information services

The resources of research and public exhibitions consist of all kinds of materials including artifacts, audio-visual materials, books, serials, and gray literature, acquired during fieldwork by the academic staff. They have to be maintained, conserved and well-organized by using databases, to be available not only to academic scholars, but also to public organizations like schools, and the general public. The Information and Documentation Center (IDC) is responsible for the functions of ethnological collection, conservation, and information services. The IDC also serves as a national center for ethnological materials and information in Japan.

The number of materials and items in the databases of MINPAKU is shown in Table 1. The left part of the table shows the number of actual materials, while the right half gives the number of items for which index information or bibliographic information is arranged as a textual database composed of sub-databases relevant to each of the materials. In addition to constructing bibliographic databases, MINPAKU has been endeavoring to develop so-called "fact-database;" namely, "image database" and "sound database" where image or sound itself is digitized and organized as a database. At present, an image database has been constructed to give four views (plan, front, side and bird's-eye) of each artifact, as well as gathering other visual materials like photographs and slides. A sound database has been constructed for audio materials like audiotapes of oral conversations, folk tales, or ethnic performances, and audio disks or audio CDs for ethnic music. The number of items, for which an

image-database and a sound-database has been made, is shown as “image data” and “sound data” at the bottom half of the right part of Table 1. All databases are available to MINPAKU staff, and some are available to outsiders through computer networks.

MINPAKU is now planning to develop a video database for documentary films taken during fieldwork by our staff. MINPAKU also conducts application-oriented research for information processing of texts, images and sound, as well as presentation-oriented research to support exhibitions by using three-dimensional computer-graphics or virtual-reality technology.

Name of Information	Materials		COMET Database	
	classification	number	classification of information	number
Books and serials	Books (Japanese)	213,394		
	(other languages)	274,482		
	Total	487,876	NME-MARC	458,871
	Bound volumes of serials (Japanese)	29,632		
	(other languages)	55,765		
	Total	85,397		
	Current serials (Japanese)	8,904		
	(other languages)	5,814		
	Total	14,718	NME-MARC (Serials)	14,776
	Miscellaneous documents			
	Microfilms	26,715		
HRAF materials	Bibliographic information slips	7,020	Bibliographic information	6,631
	Text (source) slips	928,018	Subject category codes	863,100
Audio-visual materials	Records and compact disks	44,063		
	Tapes (language)	7,965		
	Tapes (music)	6,245		
	Films (16mm)	3,038		
	Videotapes and laser disks	3,845		
	Total	65,156		
			Storage information	59,724
			Research information (Japanese)	108,265
			(other languages)	150,260
			Image data (slides & photographs)	130,941
			Sound data (CD)	13,245
Artifacts	From abroad	144,646		
	From Japan	87,991		
	Total	232,637		
			Storage information	218,033
			Research information	165,255
			Image data (artifacts)	174,935
Cultural materials in Japan: research report	Cultural materials in Japan: research report 1-19 series	19,752	Cultural materials in Japan: research report 1-19 series	18,879
			Number of data prepared	2,382,915

NME: National Museum of Ethnology, COMET: Computerized data for the National Museum of Ethnology

Storage Information: Information to administer the materials in storage, such as the name and place for storage of the materials.

Research Information: Information obtained through fieldworks by the researchers, such as who and how to use the materials.

Cultural Materials in Japan Research Report: Ethnological information regarding tools and crafts, craftsmen, visual materials and whereabouts of related publications.

Miscellaneous documents: Bibliographic materials such as pamphlets, leaflets, broadsides, off-prints, clippings, etc.

Table 1. The materials in possession and number of COMET database (as of March 1, 2000)

2. Information systems at the National Museum of Ethnology

2.1 General history of information systems at the National Museum of Ethnology

Since its establishment, MINPAKU has been introducing the latest computer systems to support the research activities, documentation and public exhibitions. In the realm of research, computer systems have encouraged computer-assisted analyses of ethnological data. The techniques to process text, image, and sound have produced several unique research outcomes. For documenting ethnological materials, various databases, including both bibliographic-databases and fact-databases like image-databases or sound-databases, have been constructed and then integrated to one voluminous multimedia database composed of many sub-databases. A retrieval system, that enables users to search multiple sub-databases simultaneously, has also been developed.

These computer systems have evolved from a centralized main frame system to a system of distributed workstations in the past thirty years, as the objective of the systems has shifted from researcher-oriented to public-oriented service, as shown in Table 3. The development of the systems in the third term attributes greatly to the recent development of information technologies including multimedia data processing and computer networks.

The current information systems are illustrated in Figure 1. Several sub-systems are connected around the local area network in a decentralized manner. The Central System is composed of several servers and it mainly controls the textual bibliographic-databases. Images of artifacts are produced and processed by the Automatic Image Input and Measuring System for Artifacts. Photographs are digitized by the High Quality Image Processing System. Those images are then transferred to and stored in the Image Server at the sub-system MMIR, which will be explained later in detail. The 3D Measuring System for Artifacts is used to compute three-dimensional coordinates of sample points on the surface of an object. From this data a three-dimensional solid model of the object is synthesized and displayed using virtual-reality presentation technology. This data is also applicable to a virtual exhibition of the objects.

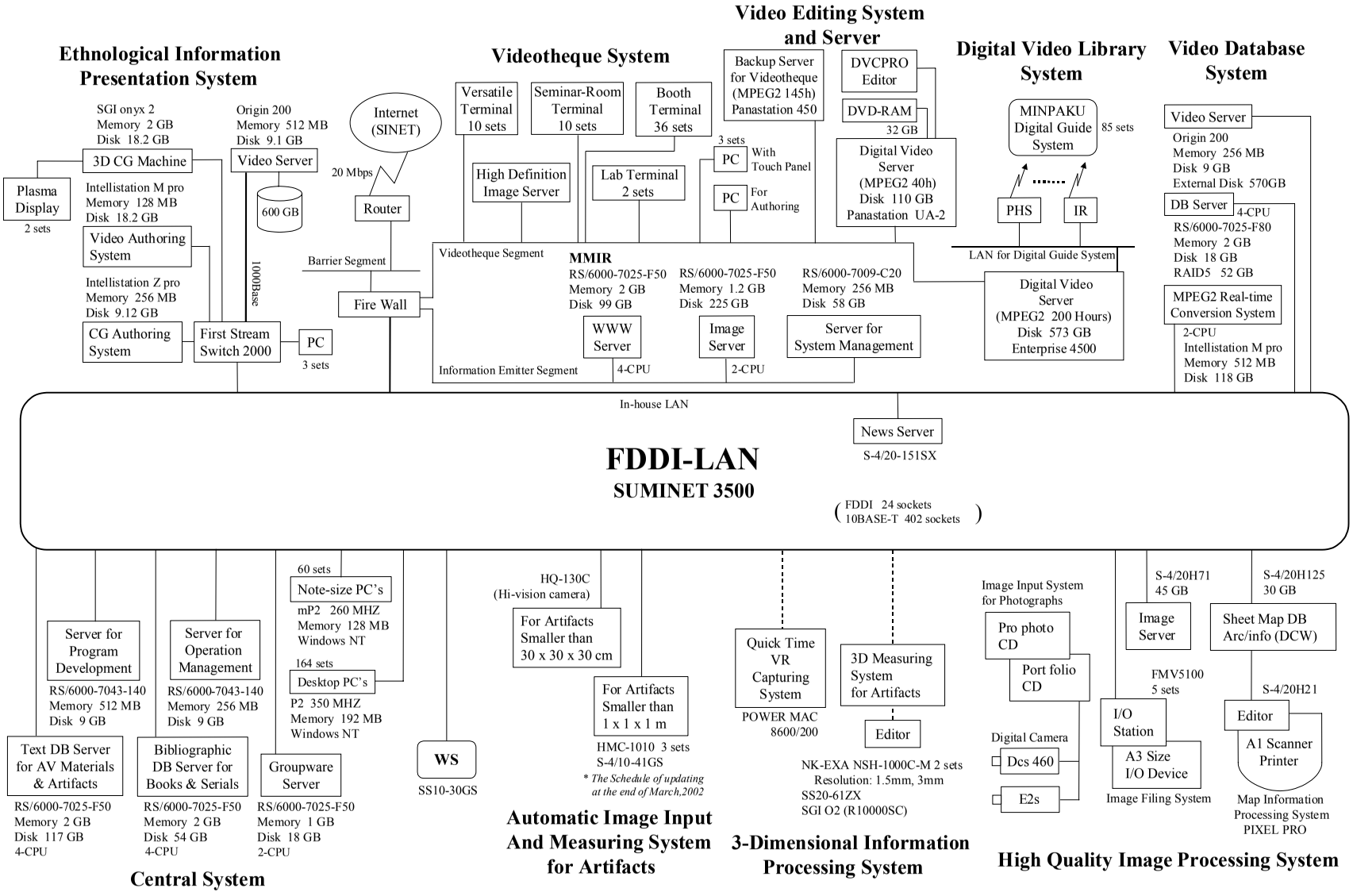
In order to supplement exhibitions, some unique computer-assisted systems have been developed. They are (1) Videotheque, a video library system, (2) Materiatheque that enables visitors to explore ethnological objects which they are holding through a computer station, and (3) Minpaku Digital Guide that provides audio-visual explanations in the exhibition hall about the objects chosen by visitors.

Term	Focus	Purpose	System Configuration
1977 – mid ’80s	Construction of Textual (Bibliographical) DB	Supporting Research	Centralized Main Frame
mid ’80s – mid ’90s	Construction of Multimedia DB	Supporting Research	Centralized Main Frame
mid ’90s – present	Construction of Video DB Provision of Information	Communication with Public (Supporting Exhibition)	Distributed Workstations & Web-base

Table 3. Stages of development of computer systems at the National Museum of Ethnology

Information System at the National Museum of Ethnology

As of November 1, 2001



When designing these exhibition-oriented information systems, we tried to provide contextual information for each object, such as how it was made and used, and other related information. The idea has been to compensate for the fact that each object was extracted from its original environment and brought to the artificial exhibition space. To recreate this context, it is not necessary to use the latest high-tech media. Any kind of media could be utilized in its most effective manner, whether it is high-tech or low-tech. This strategy could be viewed as a true "multi" media.

2.2 Information systems unique to the National Museum of Ethnology

(1) Multimedia database and its retrieval system MMIR (Minpaku Multimedia Information Retrieval system)

As mentioned before, COMET, a multimedia database at MINPAKU, is composed of several sub-databases like (1) Textual (Bibliographic) database for all materials; (2) Image database for artifacts and photographs, and (3) Sound database for audio materials.

The retrieval system, MMIR, was elaborately designed to allow users to retrieve records both cross-media and cross-database. Users can first select several sub-databases, then apply the same retrieval-term to them simultaneously. The MMIR seeks matches among those sub-databases, trying to adjust relevant index fields properly, and show the number of matches in each sub-database. Then users can proceed into a deeper browsing phase that presents detailed information together with images or sound, if desired.

(2) Videotheque

This system was developed by MINPAKU in November 1977 as the first "on-demand" video library system in the world. The system allows visitors to select one of the video programs, and view it in a booth. Videos depict the lifestyles of peoples around the world, thus assisting visitors in understanding the cultural background relating to the exhibition material.

The first-generation Videotheque adopted U-matic videotapes for storing video programs, followed by the second-generation system in March 1989, that used optical disks with analogue video signal. In May 2000, the third-generation system, that adopts fully digitized system configuration, came into operation. Video programs are converted into MPEG2 format and stored on a Digital Video Server. At present, about 380 video programs, including multimedia clips and full length films, are available.

(3) Materiatheque

This system was developed by MINPAKU in November 1996, as an experimental "Hands-on" or "Touch and Feel" exhibition. Any ethnological objects (artifacts) can be picked up from benches and shelves in a touch-and-feel area. A computer, called "Dr. Minpaku," is programmed to respond to an object placed in front of it, by sensing the signal of ID-number sent from a small chip embedded in each object. Then, Dr. Minpaku presents

a short information clip about each object. This system is intended to enable visitors to *touch* the objects, to *play with* them, and to *learn from* them. It also encourages visitors to feel the objects through their senses of sight, touch, smell, hearing, weighing, etc.

(4) Minpaku Digital Guide

This newest information system was designed by MINPAKU and introduced in March 1999, with the explicit intensions (1) to supplement contextual and related information of the artifacts, and (2) to meet the needs of individual visitors by offering multi-lingual programs, optional programs to satisfy individual interests, or programs for the handicapped.

The visitors can borrow a portable terminal of A4 size weighing about 1kg, which explains exhibits, wherever yellow dots have been put on the floor. At present about 300 multimedia explanation clips are available.

This system uses wireless communication technology of PHS (Personal Handy-phone System) and infrared signals. About 100 infrared-sensitive zones are set in the exhibition halls, where a portable terminal can identify the location and tell the system whereabouts of the terminal. Then the system transmits a multimedia clip of a visitor's choice in MPEG1 format by infrared signals to the terminal. PHS is used to transmit textual information between the system and each portable terminal.

By observing visitors' behaviour, we found some problems with this system; (1) the portable terminal is too heavy for long time use, (2) users tend to look at the screen of a portable terminal to get explanation, thus some visitors concentrate solely on the screen without seeing the "real" objects. We hope to replace the current portable terminal with a lighter mobile phone or PDA (Personal Digital Assistant) which is commercially available, and improve the scenario of clips so as to guide a visitor's eyes toward real objects. In addition, we are planning to add useful functions so that visitors can keep their personal memos or record of personal viewing, etc.

3. Potential use of the Internet at museums

In this chapter, the potential of the information technologies including the Internet at museums is discussed based on the three categories of museum activities: documentation, exhibition, and bi-directional communication.

3.1 Documentation: Toward a digital archive

(1) Cross-museum information retrieval

Nowadays many museums and art galleries are keen to construct databases of their own collection, and open them through the Internet. From the viewpoint of users, if the cross-museums retrieval is realized, it will be helpful to search, collect and compare information from among many databases. Simple text matching technique realizes this easily, as seen in many search engines on the Internet. But to get not general but specific information from databases, it is desirable for users to specify the data-field in databases with which the

retrieval-term has to be matched.

Here arises the problem of how to mediate diversity of indices among databases. As to the databases at art museums, it will be easier to arbitrate the differences because the number and variation of data-fields are limited to artist name, theme, period, material, etc. For example, Tokyo National Museum proposed common fields for the art database of Japanese cultural assets, developed portal-site with a retrieval function based on this proposal, and now invites Japanese art museums to participate in this experimental project. On the other hand, as the nature of museums varies from natural science to history or folklore, difference in terminology, data structure, arrangement of data-fields is so diverse that its mediation is not so easy as is in the case of art museums. To solve this problem, an arbiter embodying sets of thesauri will be necessary. By using the thesauri, different terms and names of data-fields among databases can be translated into a common one. If this kind of arbiter function is realized and managed by an agency or public organization, digital archives being constructed everywhere will be virtually and effectively integrated.

(2) Collaboration between academe and non-academe

In the human science like ethnology, one finding on culture by a researcher might represent only one phase of the fact, not a whole. Sometimes an informant in the field makes fictitious remarks either intentionally or domestically. Information about an object given by one researcher is not always objectively true. In some cases even the name of an artifact is subject to controversy. Consequently it seems dangerous to rely on solely one information source when constructing a database about objects. On the other hand, there are many specialists on a specific theme outside the academe. Inviting those people to collaborate in constructing a database will help to accumulate various opinions and knowledge in one place.

The Internet will be useful to collect information about objects, if a database is designed and opened to the net in a way that users are allowed to input data into the database, after disclosing their identity. Of course a user-identification mechanism is indispensable to avoid irresponsible disturbance from anonymous people. Once this mechanism is realized and knowledge starts accumulating in a database, it will act as a magnet to attract more information. Thus the use of the Internet will contribute to integration of human knowledge as a “knowledge base.”

(3) Resource sharing and data exchange among museums

Almost all museums in the world suffer from the similar problems such as shortage of funds, indifference of governments toward cultural activities, decrease in number of visitors, etc. If a museum network is virtually established using the Internet, then data, experiences and problems of each museum will be exchanged and shared. This will lead to not only data sharing but also cooperative works on museum management to solve various problems among museums.

(4) GDM (Global Digital Museum)

Since 1995, MINPAKU and Japan IBM research division have been developing an experimental system named Global Digital Museum. The initial idea was to provide school teachers with tools to retrieve and collect multimedia data from many museums in a cross-museums manner, to combine and edit the data into one multimedia content, and to attach their own annotations to it. With these tools, teachers can develop their own multimedia teaching aids. Based on this idea, an experimental system was developed in cooperation with the Education Service Section of the British Museum and Cornell University, using some data from both MINPAKU and the British Museum.

By introducing money-charging and user-identification mechanisms to GDM, it will be upgraded into a knowledge-base integrator described in (2), because the mechanism for users to edit and upload data has already been embodied in GDM. We hope to upgrade GDM in this direction if a sufficient fund for development becomes available.

3.2 Exhibitions: Toward a virtual museum

(1) Supplement to exhibitions inside the museum

The primary objective to use information technologies in the exhibitions is to supplement contextual or relating information of objects, such as how it was made and used, to what rituals it was related, papers or books to be referred to, etc. To supply visitors such information, the most appropriate and effective way should be adopted among various types of presentation like databases, multimedia clips, or video programs, etc. Thanks to the development of technologies in web-base data-representation and browsing, we can utilize commercially available devices and softwares to supply above information even inside the museum.

(2) Virtual exhibition inside the museum

Using the three-dimensional presentation technologies such as VRML (Virtual Reality Modelling Language) or 3DML (3-Dimensional Modelling Language), viewers (users) can walk through exhibition spaces and see objects virtually synthesized inside the computer. This technique liberates an exhibition from physical constraints, and is best utilized in the following example of virtual exhibition:

(a) Rare and precious objects in the storage can be exposed virtually to the viewers, like "Visible Storage" system.
(b) Objects could be placed in an imaginary past or future environment. For example, a contextual environment of archaeological objects is restored to make such an exhibition more understandable to the viewers.
(c) Virtually synthesized objects are easily enlarged or reduced to any size. The viewers may enjoy what they discover through a microscopic or macroscopic view of the objects.
(d) Excavated objects easily weather and are damaged by exposure. If their

three-dimensional shapes and colors are captured, their original states will be recorded and preserved although in a digital form.

(e) In a virtual exhibition space, objects are easily repositioned or rearranged. Therefore, it is easy to create an exhibition in different categorization from the actual one. Even visitors or viewers can create their own exhibition in a virtual space. This is one possibility for offering an open space where people can express their own idea.

(3) Catering or delivery service of a virtual exhibition outside a museum

The virtual exhibition mentioned above can be easily delivered outside a museum by using the Internet. An idea "Museum at home" will be realized. This possibility provokes a debate whether virtual exhibitions on the net are beneficial or harmful to the museum in terms of the number of visitors. Sometimes an anxiety is discussed that virtual exhibitions satisfy the interests of people on the net, and discourage them to visit the museum, resulting in decrease in the number of visitors to the museum.

If a virtual exhibition is an imitation of a real exhibition, then the real exhibition may fail to attract visitors. But if a virtual exhibition is so designed as to supplement a real exhibition, and to assure the advantage of the real over the virtual, then the virtual exhibition will be positively utilized as a new tool for digging out potential museum fans and drawing them toward the museum. The virtual and real exhibitions have to be designed as complementary to each other. In addition, functions of a virtual exhibition inside and outside the museum must be elaborately separated.

3.3 Enhancing bi-directional communication between museums and visitors

The best advantage of the Internet lies in its ability of bi-directional and horizontal communication. Using this, the ordinary public relations activities of a museum could be enhanced in such a way that the opinions or information from the public is properly reflected to the museum's overall activities. Once a good relationship with the public is established, it will help to foster museum-supporting groups.

Another challenging use of the net by museums is to provide a "virtual forum" for the public. People are welcomed to the forum where opinions or information on a specific theme is presented, exchanged, and discussed. The forum may give birth to a new community on a specific theme, and it may become its information center. The recent discussions about museums' functions sometimes refer to the term "forum," which connotes that exhibit-side (museum-side), exhibited-side, and visitor-side must be treated equally, and that people are encouraged to discuss the theme of exhibition. The virtual forum on the net will show one possibility in this direction.