Metadata Development for Digital Libraries and Museums – Taiwan' s Experience

Hsueh-hua Chen
Department of Library and Information Science
National Taiwan University
Taipei, 10660, Taiwan, ROC
sherry@ccms.ntu.edu.tw

Chao-chen Chen
Department of Adult and Continuing Education
National Taiwan Normal University
Taipei, 10642, Taiwan, ROC
cc4073@tpts1.seed.net.tw

Abstract

In the digital library/museum environment, metadata plays a crucial role, and the development of metadata is not an easy task. Its formulation has to begin with analysing the attributes of collections, and understanding the user information needs and information seeking behaviours. The issue of interoperability needs to be considered in terms of both semantic as well as syntax. This paper introduces the background information of Taiwan's Digital Museum Project, and discusses issues related to the development of metadata for use in this project.

1. Introduction

Recently, with the rapid development of Internet, researches on digital libraries and digital museums have received worldwide attention; and all developed countries are supporting these researches with great enthusiasm. In Taiwan, we have rich cultural heritage with a wide range of treasures, many organizations and research institutions possess abundant collections of rare books, historical remains, artefacts and documents on both local Taiwanese and traditional Chinese culture. In the past, they were not open to the public due to preservation considerations. Now, through the powerful Internet, we will be able to present these valuable resources on the WWW. Besides increasing public exposures, it will preserve the physical resource that might be otherwise deteriorating.

In Taiwan, major institutions those have digitised their rare collections include National Taiwan University, Academic Sinica, National Central Library, National Palace Museum, National Museum of History, National Museum of Natural Science, and so on.[1] To digitise these valuable resources and present them on the web is their primary task. However, it is much more important to organize these resources based on their characteristics. Therefore, users may retrieve and use them effectively. It is obvious that metadata is vital to digital library/museum systems.

From the perspective of users, a digital library/museum should contain basic functions of retrieval, browse, and links to other related web resources. Usually, a digital library/museum with a large volume of data will apply database management system to manage its metadata, digital objects, and the links, etc. This paper will discuss issues related to the development of metadata in Taiwan, and introduce the Metadata Interchange for Chinese Information (MICI), which is developed under the Digital Museum Project funded by the National Science Council, Taiwan.

2. The Development of Digital Museum Project in Taiwan

National Science Council (NSC) of Taiwan launched "Greeting a New Millennium—A Cross-Century Technology Development Program with Concern for the Humanities" in 1998 with an intention to strengthen researches on humanity/social science and science education. Digital Museum Project (DMP) was part of this project, and its main goals are to integrate and establish a digital museum, which emphasize culture as well as science content with educational value for the general public and students in Taiwan.[2] By establishing and promoting educational content on the web through the powerful Internet, the public may retrieve or browse information freely; consequently, users may experience its

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enrichment and enjoy the lifelong learning.[3] Furthermore, by promoting digital collections, NSC hopes to stimulate the technology development of multimedia and the growth of content industry.

During the first phase (Sep. 1998-Aug. 1999) of Digital Museum Project, NSC invited experts and scholars with experience on digital collections to form a collaborative mechanism to promote digital museum researches. Under Digital Museum Project, there are two types of projects: topic-based projects and technical support projects.[4] In addition, DMP Extension is responsible for training and promotion by serving as a bridge for library/museum communities, teachers, industries, and DMP researchers and staff.

DMP's topic-based projects in the first phase include local spotlight and traditional culture. Specifically, there are two comprehensive projects on local Taiwanese culture: "Discovery of Tamsuei River" and "Taiwanese Aborigines – The Ping-pu Tribe". On natural science and environmental ecology, there are "Butterfly Ecology" and "Native Plants and Fishes of Taiwan" projects. On traditional Chinese culture, there are three projects: "Traditional Thoughts and Literatures (The Four Books, Lou-Chuang, Poems of the Tang Dynasty)", "An Immortal Palace —Han Dynasty Culture and Burials", and "Firearms and Ming-Ching Dynasty Warfare".[5]

Technical support projects in the first phase consist of five different areas, including: geographic information system, word net, metadata, copyright, and evaluation. Among these five areas, we led a metadata research team, ROSS (Resources Organization and Searching Specification), to study metadata related issues and to design metadata suitable for Chinese materials.

The principal investigators of the first year's project were professors and researchers mainly from Academic Sinica, National Taiwan University and National Ching-Hua University.

The second phase of the Digital Museum Project was carried out from January 2000 – December 2000, which was open to all interested participants. Among nearly 90 topic-based proposals, 12 were selected and funded by NSC and four of them were carried on from the first phase.[6] These topic-based projects are listed as follows:

1. Treasurers of the National Palace Museum
2. The World of Xuanzang and the Silk Route
3. Discovery of Tamsui River (II)
4. Native Artist Digital Museum—Yu-Yu Yang Art Research Center
5. Historical Photos of Taiwan
6. Architectural History of Taiwan
7. Mystery of Human Body
8. Taiwanese Aborigines —The Ping-pu Tribe (II)
9. Ancient Texts and Popular Songs of Tang and Sung Dynasties (II)
10. Native Freshwater Fishes of Taiwan (II)
11. Chinese Medicine and Acupuncture
12. Biology-Cultural Diversification of Orchid Island

During the second phase, two technical support projects on metadata and digital watermark were carried out. ROSS team continued its metadata research and developed an XML/metadata management system — Metalogy.

Since the second phase projects were opened to interested participants, the principal investigators were from many other universities and organizations other than three institutions mentioned in the first phase.

Currently, The Digital Museum Project is in its third phase, and 15 topic-based projects were being selected which cover a wide variety of different topics, including: language literature, religious art, folk culture, historical relics, mathematics, biology, architecture, and geography, etc.

3. Resources Organization and Searching Specification

Before NSC launched the Digital Museum Project, we initialised a metadata research team, Resources Organization and Searching Specification (ROSS), under the National Taiwan University Digital Library/Museum (NTUDL/M) Project in March 1997. Its research scope contains the following: to understand the history and features of collections, to study various metadata formats both domestically and internationally, to understand relations among metadata, database and the system framework, and to understand information needs and information seeking behaviour of potential users. ROSS held that, the metadata should be able to describe attributes of the collections, to provide users with the mandatory access points, to enhance interoperability among different digital libraries and museums to exchange information, and to consider the quality of cataloguing. Most digital collections of NTUDL/M were historical documents, after studying the characteristics of historical documents, ROSS made in-depth studies of the metadata of similar types of collections, including CIMI (Computer

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Interchange of Museum Information), Dublin Core, EAD (Encoding Archival Description), TEI (Text Encoding Initiative) Headers, etc. Nevertheless, due to cultural and characteristics differences, these metadata formats are not sufficient to describe Chinese special collections. Hence, it is necessary to focus on the research on Chinese metadata, which is the main goal of ROSS.[7]

When the NSC lunched the Digital Museum Project in 1998, ROSS team were invited to participate one of its technical support project. In the first phase, ROSS team was responsible for the metadata development for topic-based projects, mainly for "Discovery of Tamsui River" and "Butterfly Ecology". In the second phase, the main task of ROSS team is to develop a metadata management system, Metalogy, which is capable of handling various types of metadata for use by topic-based projects. Currently, Metalogy is used by several organizations, including: National Palace Museum, National Taiwan University, National Chiao-Tung University, and some other libraries, etc. Among them, ROSS team spent most of the time to assist National Palace Museum to develop metadata for their contents.

4. Procedures for Designing Metadata

According to our experiences, the development of metadata is not an easy task; it includes at least seven steps.

4.1 Analysing the attributes of collections:
The first step in formulation of metadata is to understand and extract the common features and characteristics of collections. We spent lots of time to discuss with content experts in order to better understand the attributes of collections.

4.2 Needs assessment of metadata users:
Interview the content experts and potential users to understand their information needs and information seeking behaviours.

4.3 Interoperability Consideration:
During the development of metadata, special attention was paid on the compatibility with international standards; thus, we joined The CIMI Consortium (Consortium for the Interchange of Museum Information) since 1998 as its member and were involved in its Dublin Core Testbed Project. We attended the 7th and 8th meetings of Dublin Core Metadata Initiative (DCMI) to gain the up-to-date development of Dublin Core. We also explored what is the best format to be used to express complex digital library/museum content. And we decided to use extensible Markup Language (XML) as the preferred format of syntax.

4.4 Semantic design of metadata:
We designed Metadata Interchange for Chinese Information (MICI), and adopted qualified Dublin Core as its basic structure for metadata semantics, and this set of metadata is named as MICI-DC.

4.5 Developing metadata management system:
We developed Metalogy metadata management tool for different types of metadata, including MICI-DC. This system may be used to develop databases for any digital library/museum in different subjects. Functions of Metalogy include database set-up by the DTD, metadata edit, authority file edit, retrieval (including both Window and Web interfaces), and import/export of XML files, etc.

4.6 Developing tagging guide and user manual:
In order to make it easier for users to catalogue their collections using MICI-DC, a tagging-guide was complied with explanations and examples on the 15 elements and their qualifiers.

4.7 Providing training courses:
In order to promote Taiwan's museum community to better understand metadata, we organized a " Workshop on Dublin Core for Museum" which was held in March 1999, and Executive Director of CIMI and other two metadata experts from UK Office for Library and Information Networking (UKOLN) and American Museum Online (AMOL) were invited as speakers. When MICI-DC and Metalogy system was done, ROSS team members continue to provide training courses through Digital Museum Project Extension Office.

5. Metadata Interchange for Chinese Information

MICI-DC has been used to catalogue various types of collections: historical documents, old maps, photos/pictures,

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calligraphies, objects, and Buddhism scriptures/paintings. Users may choose DC's 15-element and qualifiers and adjust the orders of these elements according to their needs. In addition to DC's official qualifiers, in order to describe the attributes of our rich cultural heritage and be more precise on the semantics of the collection descriptions, local qualifiers were added to appropriate elements based on the attributes of collections, individual institutions might also define their own qualifiers based on the attributes of its collections. This will be compatible with international standards, and meanwhile, allow users with great flexibilities in meeting the local needs.

The details of MICI-DC is listed as follows:

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Metadata Interchange for Chinese Information (MICI-DC)* Last Modified 2000.07.03

Element	Qualifier		
Type	Aggregation Level	Item/ Collection	
	Original / Surrogate	Original/ Surrogate	
	Cultural / Natural	Cultural / Natural	
	DC Type	interactive resource	
		dataset	
		event	
		image	
		sound	
		service	
		software	
		collection	
		text	
	Local Level		
Format	Medium		
	Extent (size, duration)	Quantity	
		Dimension	Name
			MeasurementsUnit
			Position
Title	Main		
	Subtitle		
	Alternative		
Description	Acquisition	Method	
		Source	
		Price	
	Physical Description	Illustration	
		Color	
		Material	
		Attachments	
		Form Whole Object	
		Part Of Object	
		Scale	
	Abstract / Synopsis		
	Place		
	Collection Or Site Information	Locality	
		Name	
		Date Gathered	
		Field Number	
		Method of Collection	
		Type Of Site	
		Coordinates	
		Coordinates of Object	
		Phonomena	
		Accompanying Object	
		Cultural Layer	
		Geological Period	
		Age	
		Environmental Details	
	Seal Type	From Artist	Artist Inscription Seal Locality
			Artist Inscription
			Artist Seal
		About Colophon	Colophon Locality
			Colophon Writer
			Colophon Seal
			Colophon Full Text

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Element	Qualifier		
		About Label	Label Locality
			Label Writer
			Label Seal
			Label Full Text
		About Loose Leaf	Loose Leaf Writer
			Loose Leaf Seal
			Loose Leaf Full Text
		From Collector	Collector Seal Locality
			Collector Seal Inscription
	Inscription	Series Number	
		Position	
		Category	
		Style	
		Content	InscriptionContent Full Text
			InscriptionContent Image
	Decoration	Series Number	
		Position	
		Category	
	Transcription		
	Mount	Volume Cover	
		Protective Covering Case	
		Book Case	
	Release	Edition Name	
		Binding	
		Style Form	Border/ Column
			Center Boundary/ Row
			Block Heart
			Frame Mark
		Lines Per Page	
		Font	
	Exhibition	Exhibition Name	
		Exhibition Size	
		Object Description	Exhibition Description
			Recommendation
			Web Description
	Condition		
	Grade		
	Notes		
Subject	Subject Descriptor	Primary Subject	
		Secondary Subject	
		Other Subject	
		Situation	
		Function	
		Technique	Series Number
			Position
			Category
		Style And Movement	
		Personal Name	
		Corporate Body	
	Keywords		
Creator	Personal Name		
	Dynasty		
	Birth Place		
	Corporate Body		
	Role		

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Element	Qualifier	
Contributor	Personal Name	
	Dynasty	
	Birth Place	
	Corporate Body	
	Role	
Publisher		
Date	Cataloging Date	
	Created	
	Issued	
	Acquired	
	Modified	
Identifier	CallNumber	
	AccessionNumber	
	URI	
Source		
Relation	Is Reference Of	Reference Work
		Collection Catalogue
		Research Material
	Has Part	Part Title
		Part Creator
		Part Contributor
		Pagination
	Is Part Of	
	Citation	
Language	Cataloging Language	
	Item Language	
Coverage	Spatial	Place Of Use
		Scope Of Coverage
		Place Of Event
	Temporal	Period Of Use
		Date Of Event
Rights	Owner Name	
	Owner Country	

* MICI-DC was developed before “Dublin Core Qualifiers” was announced

6. Lessons Learned in the Development of Metadata

During the last four years, ROSS team has been experiencing the increasing scale of collaboration, from inter-campus project in National Taiwan University to gradually into a national level project – Digital Museum Project.

Like other pioneer projects, ROSS team suffered through the initial period of trying to find a common language and a right working model among people from different disciplines. Yet, several factors contributed significantly to the success of the metadata development. First, it can be attributed by the bondage by a strong sense of mission and urgency to preserve the indigenous Taiwanese cultural heritage. Second, the early participation in the CIMI metadata testbed project gave us a jump-start on the metadata development. Third, during the process of metadata development, ROSS team held frequent discussions with content experts to better understand their information needs and seeking behaviors. In addition, discussion meetings were held periodically for all staff to report their work progress and to understand each other’s progress. Furthermore, besides official meetings, social activities also played an important role to “break the ice”; it helped people to get acquainted and enhanced the willingness of cooperation.

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