A STUDY ON MULTIMEDIA MANAGEMENT SYSTEM BASED ON CULTURAL HERITAGE

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Abstract

To manage the information of cultural heritage by adopting digital technology has become an important issue on the perseverance of cultural heritage in the 21 century. Apart from written documents, cultural heritage also includes various video (cad, point cloud, photo, video) and audio (sound and video recordings) records. In the process of digitization, an integrated approach is essential for clear management, interpretation and presentation.

This research has established a subsystem for the database of cultural heritage to manage the video and audio information with the following procedures:

1. *First, analyze the individual characteristics of the cultural heritage and its content, and then create its video and audio metadata.*
2. *Establish an appropriate management plan according to the characteristics of each video and audio document.*
3. *Combine xml with metadata to present different video and audio documents, and then create their index and presentation mechanism.*
4. *Finally, by combining the above information, with this integrated technology, we can manage and share the database through Internet.*

This research points out the importance of creating proper metadata for video and audio documents. Through the process of formalization, we can introduce a more efficient and convenient database management system for video and audio records of cultural heritage.

1. PREFACE

Since the late 20th century, the information has been stored by digital wit rapid development of computer. Preservation of cultural assets, digital technology plays an important function of supporting preservation.

In 2008, ICOMOS adopted the "interpretation and presentation of cultural heritage sites of the charter" in Quebec, Canada and mentioned the importance of implementation of digital technology.

In1992, UNESCO World Documentary Heritage promoted "Memory of the World Program" which is an international project to preserve the valuable historical files, documents and other records. During 1997 and 2009, the program registered once every two years. There was a total of 7times to registry and 193 files such as "Dutch East India Company Profile", "Chinese traditional music audio files" and "Ancient Naxi Dongba Literature", etc. To assist long-term preservation, it use a large number of digital technology.

With the rapid development of technology has changed the production and dissemination of information, now as long as the Internet can find the relevant information required for multiple than in the past and dissemination of information on the slow pace of production difficulties, data is now easier to get on, but Full of information often needed for more time to review the required information (information explosion.) It is an important issue to make image data classification, management and application of the future of digital heritage preservation.

For the preservation of cultural and historical archives, museums and libraries have a nice management structure. Therefore, this study through the museum and library management, applied to cultural assets and digital file management. In this study, the digital content management, the use of Meta data interpretation, according to the Cultural Heritage Preservation needs to build decent metadata, so that the digital content owners can be identified as functions, and XML as the carrier management and classification, the study also will analyze the common technology and application.

2. LITERATURE REVIEW

2.1 Taiwan Digital Archives Technology

Taiwan is located in the eastern part of Asia, the Pacific islands north-west, near the Chinese mainland, according to historical records and can verify the history of Taiwan from around 1624 BC, was experienced Jose, Ming and Qing Dynasties, Japanese rule and the Second World War IV Periods, thus creating the diversity of history and culture of Taiwan. In order to save Taiwan's cultural assets, the "Taiwan National Science Council" in 1998 to promote the work of a series of digital archives, funded a series of systematic Digital Archives Project to preserve the value of Taiwan has kept the information Such as culture, science, art, music, animals and plants, both for the National Science Council of the scope of digital archives. Recently, the importance of international knowledge management, management of digital archives has to "integrate" the concept of effective management and data sharing become an important issue.

China National Science Council's "National Digital Archives Science and Technology Program", in response to a number of different areas are divided into groups to building data integration, mainly by the "Map and building group " responsible, in 2008, "Taiwan Architecture Diversity Resources and Digital

Archive search network to guide the plan "a meeting of experts to discuss, given Taiwan's digital architectural collections many of the proposals put forward five main themes:

A. Scope of the proposed construction Collection Content: In addition to construction and Structures of the body, the surrounding environment, landscape, literature and oral history, map data, are collections of focus.

B. Classification of the principles of construction: In order to show the context between the buildings, as well as the convenience of searching and applications, according to age, culture and functional classification.

C. Building the proposed criteria selection: According to history, scarcity, urgency, and to select four representatives.

D. builds Meta data: According to "Art and Architecture Thesaurus (Art & Architecture Thesaurus, AAT) ", the metadata building.

E. Application Architecture Digital Archive: Building the future direction of digital content, Ke Yi tourist guide application, the promotion of local education, to consider the use of the city, entertainment marketing efficiency as the goal.

2.2 Metadata

Metadata is generally defined as data information (Data about Data), U.S. National Information Standards Organization (National Information Standards Organization, NISO) will be defined as: "used to describe, explain, look, or other digital information can easily be Deshu Access, use or management of structured information. ", then the most important function of data set two, resource exploration and management of electronic resources (Jean Hudgins, 1999), the following is a common metadata standard.

2.2.1 Dublin core metadata standards (DC)

Currently the most widely used metadata for the Dublin core metadata standards (DC), 1995 by the Dublin Core Metadata Initiative (DCMI) organization, is a set of simple but effective set of core elements. The DC was originally intended to solve the web search efficiency and enhance the library's catalog record for goals in detail. The total of DC is fifteen data elements, the initial set on a simple and easy to maintain, easy to understand the semantics common, universal, flexible high four principles. (MAAT, 2007)

2.2.2 VRA Core Categories

This standard by the Visual Resources Association (Visual Resources Association, VRA) of the proposed standard clearly works for the meta data and images for interpretation, and its total of 17 data elements, in accordance with their characteristics as follows Dublin Core1: 1 semantic principles for the definition of each object metadata content, clear standards in the VRA into work and image resources for work in the VRA Core 3.0 will be defined as already exists, ever existed or may exist in the future Entities, such as. Images are through photography, scanning, etc. (Table 2-2).

Table 2-1: VRA 3.0 Structure

Record Type	Type	Title
Measurements	Material	Technique
Creator	Date	Location
ID Number	Style/Period	Culture
Subject	Relation	Description
Source	Rights	

2.2.3 Categories for the Descriptions of Works of Art, CDWA

CDWA described as works of art categories (Categories for the Description of Works of Art, CDWA), by Paul. Getty Trust (J. Paul Getty Trust, commonly known as the Getty) Art Information Group (The Art Information Task Force, AITF) R & D its characteristics are six, 1. Subject property, the use of the term us more professional category. 2. for the artifacts to interpret the original 3. Save the finished works of art and architecture.after the entire set of data 4. It is Flexible on the Catalog 5. Mining system development approach 6. There are a total of 27 categories, sub-category of not more than three.

Research from the U.S. Library Consortium (Research Libraries Group, RLG) study can be composed of Meta data into the information architecture as Data Structure, Data Contend, and Data Value. Follow to the three elements.

A. Data Structure: RLG organizations interpreted as "the organization or grouping of the data fields". Data structure selected, need to consider the use of functions to the data, the common use of functional types can be divided into management type, descriptive, preservation-based, technology-and use-based ,etc. (Gilliland-Swetland, 2000)

B. Data Contend: RLG organizations interpreted as "a set of rules, guidelines specific data field of the book records (rules that guide you infilling a particular data field). "Referring to the metadata index or field name the title of the post metadata, so that more of several digital data can be properly classified and management.

C. Data values: limitations on content for the field, such as the date format and unity, and other bits of text in order to make management easier.
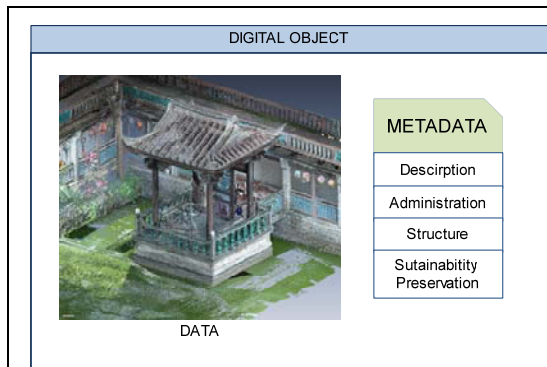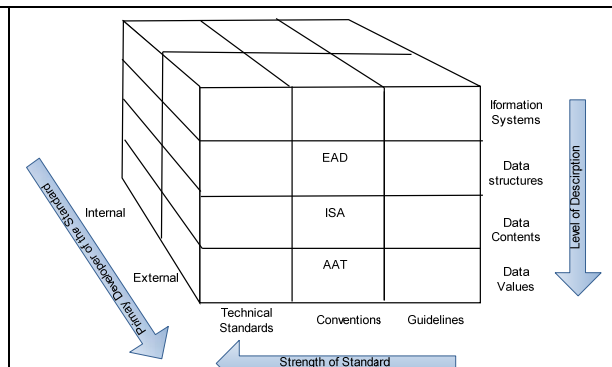

Figure 2-1: Metadata into digital files	**Figure 2-2:** Borrowed form：David Bearman's WGSAD Matrix(1989)

2.3 Metadata carriers

Meta-data into the work, due to different usage requirements, there are a variety of storage methods, such as the structure of the relational database, semi-structured XML database and object-oriented database (Object-oriented Database), etc., but The most commonly used in digital archives and storage methods for the relational database and XML database (XML database) in two way. Follow to the details.

2.3.1 Relational database

Relational database is the most common management, the concept of rows and columns by way of two-dimensional structure (form) expression data presentation and processing methods, and make the database available with independence, integrity and security of the three Characteristics, the formation of relational database can be divided into rows and columns, each row of the table (also known as the column field) represents the same information on the nature, form each column (row) represents one record, multiple different nature Project. In order to make effective management and presentation of data, the relational data has to be normalized after treatment, to reduce data duplication and inconsistency. Preservation of digital files and management applications, relational database is characterized by the technology developed in the management of Meta data than can be unified, but the metadata for the content of the complex is more difficult to import.

2.3.2 XML

XML is an Extensible Markup language, is markup language designed to describe, store and exchange data, the computer on different platforms can communicate with each other's language. XML as data portability, the label itself contains its own meaning, and also with the structure and semantic information, can carry out their own data description. Form of XML data is hierarchical and more, and database table format is different, complex and data access to large amount of other information such as regulations, contracts, etc., and has interchangeable characteristics, contribute to the sharing and exchange of information . Markup language but do not have the traditional database management capabilities, and thus can not be achieved in the management of information than unity. Cultural heritage digital data meta data for the combination of many disciplines, so this study provides information used to access the complex and large amount of XML, the key directions for the future.

Figure 2-3: xml appearance

2.4 Summary

In the constitution of the text from the above, can be found in the preservation of digital information has been attached. Cultural heritage assets are important knowledge predecessors, in addition to important assets of all countries and business opportunities, effective management and application will be a future issue. Through various studies, can be found to the "integration" and "sharing" will be cultural assets of the future trends of digital content. Therefore, this research through meta data and database technology, build effective multimedia management system, so that cultural heritage digital content to the following four functions:

A. Data can be managed properly

B. Quickly search and present the necessary information

C. Information associated with the sharing and features
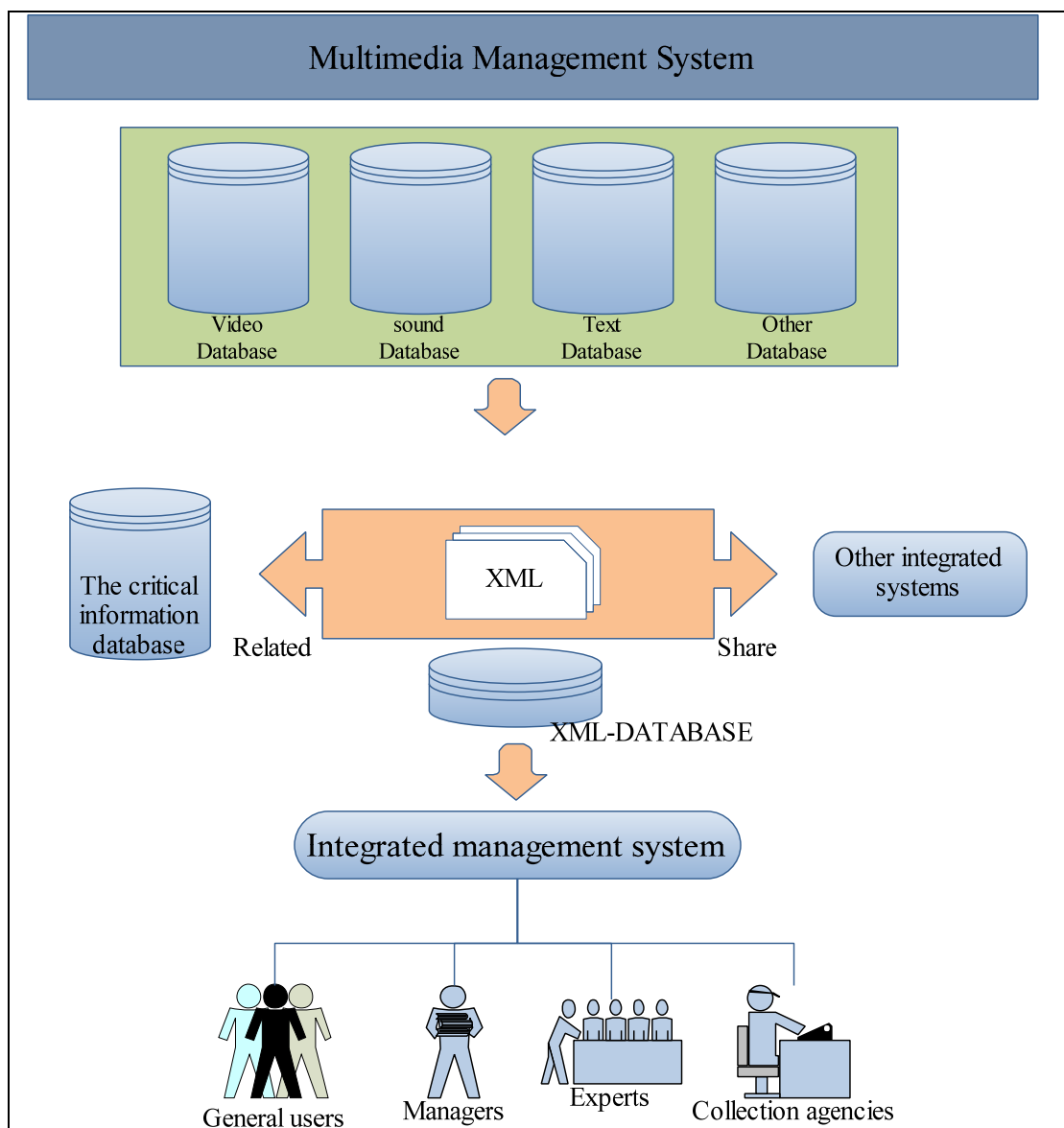
D. Data can be stored permanently

Figure 2-4: Multimedia Management System Architecture

3   DIGITAL CONTENT

Digital content that is the real world things in digital way of "rendition," in a thing (language, photos, etc.) to represent other things (a witness to the act, a person), but the two are not identical; reproduce itself is one thing, not just something alternative. (Marcus Banks, 2010), under the cultural assets of historic buildings to view, a common digital data including graphic symbols, video and audio categories; its features reappear under different aspects of the monuments, the data include:

A. Write symbol data: information on the historic buildings, with a description of play, record, organize and preservation work, through words and symbols may be the preservation of digital information objectively, often used in interpreting the data, and data analysis of post-production.

B. Audio data: audio data to show the way can be classified into two-dimensional still images (photos, graphics, CAD, etc.), three-dimensional still images (3D model, point cloud data, etc.) and dynamic images (animation, video, etc.) three categories. Video plays the role of analysis of cultural assets, restoration and presentation.

C. Audio data: record of important information through the recording equipment (oral information, qualitative research, etc.), audio information in addition to stand alone, but also can be attached to the video information.
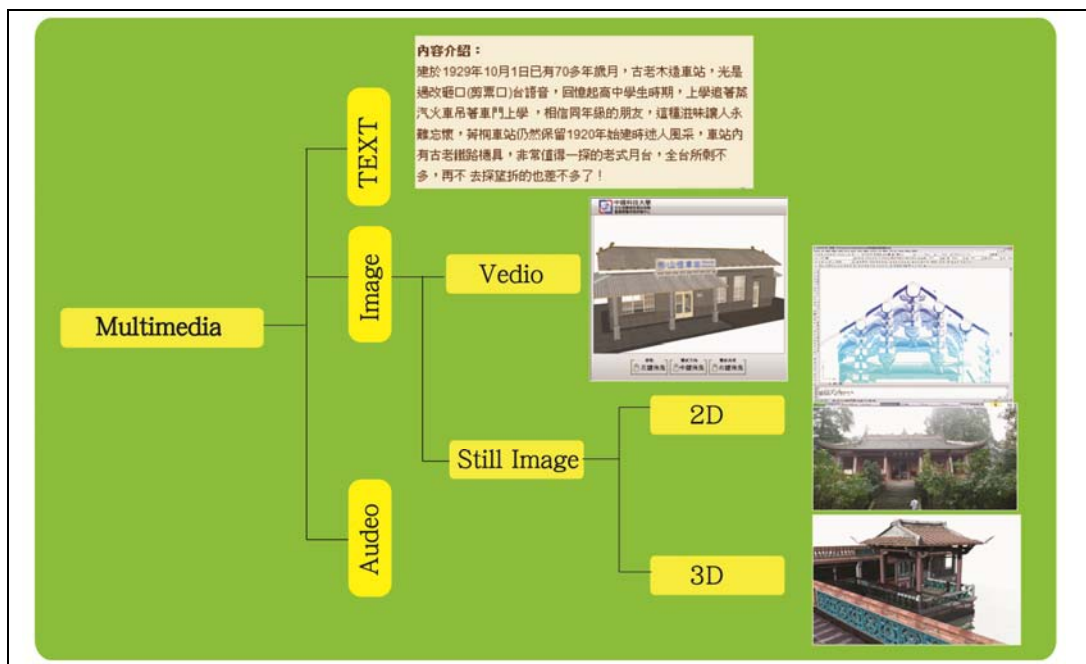

Figure 3-1: Digital content classification map

4   METADATA PLANNING

Architectural preservation of cultural assets of much digital content, so the metadata to build on the need to consider the demand side, Lucas mentioned that metadata must satisfy three demand sides. A. Each object is unique, and can be done of. B. Each object has a variety of ways that can be search. C. described the need for each object and other records, objects, information or knowledge of the relationship between the information (Marty Lucas, 2007). To achieve the above requirements, the meta data from this study constitute the elements of analysis and the establishment of metadata content, meta data according to RLG will constitute a large data structure to be divided into data structure, data content, and data values, the following data for this study the content and data structure details
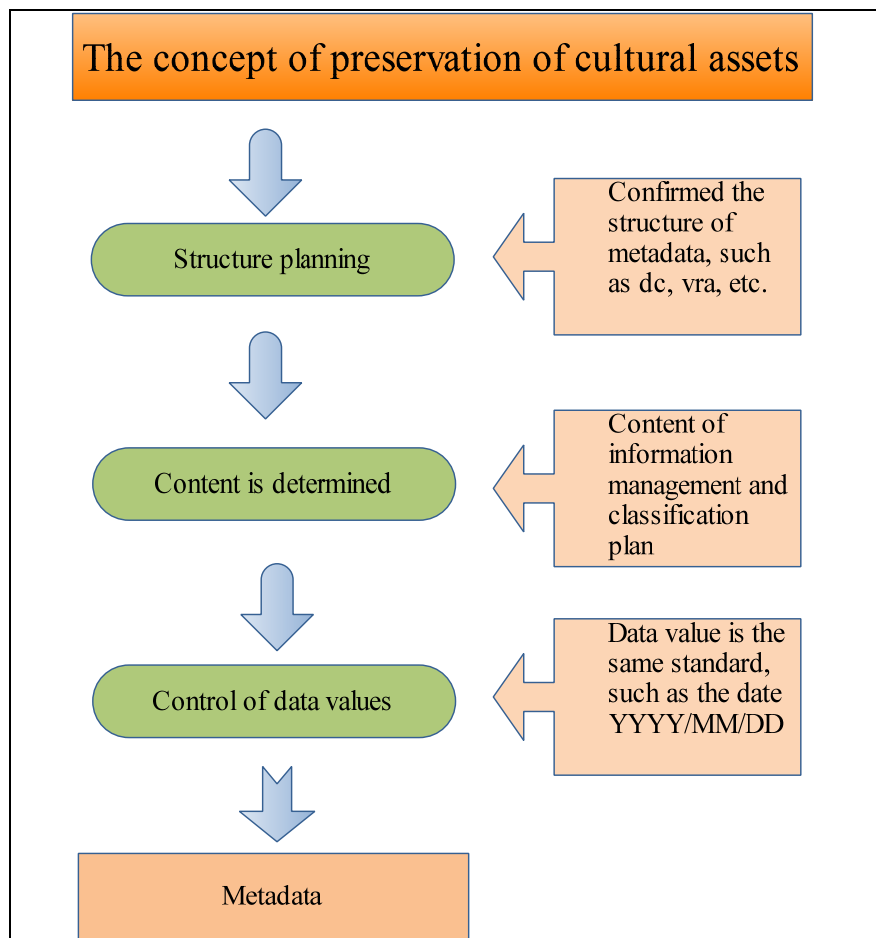
The concept of preservation of cultural assets

Structure planning ← Confirmed the structure of metadata, such as dc, vra, etc.

Content is determined ← Content of information management and classification plan

Control of data values ← Data value is the same standard, such as the date YYYY/MM/DD

Metadata

Figure 4-1: Metadata design process

4.2 Data Structure

Common use of functional types can be divided into management type, descriptive, preservation, technology-based and use-based and other types of (Gilliland-Swetland, 2000), in order to achieve the exchange of information, the Committee of the National Science Digital Archives Project for the use of DC Meta-data architecture standards, integration of the national digital content and manage, and various units of the metadata content needs and the National Science Council of the standards compliance in order to integrate the management and exchange, and thus this study, DC extension application out of the VRA Standards Meta data for the design standards, VRA standard visual arts major pin digital content, from DC to amplify the 17 standard elements, you can meet the architectural and cultural assets of the common digital video and audio content, and can also increase the demand element.

4.3 Data Content

Management of cultural heritage digital technology can be divided into two government agencies, namely, the National Science Council and the promotion of Cultural Affairs, Cultural Affairs has been established for the building itself forms the relevant metadata, and the National Science Council Digital Archives Program Under "Maps and the Building Committee" also relevant for the digital files of architectural planning a "common building types meta data fields, "and with the above field and increase the use of common needs, this study will be composed of five types of metadata States were discussed,

summarized as follows:

4.3.1 Managed data given in the contents

The information to be able to be managed properly, will require detailed classification of cultural assets, the management of digital data available from the traditional file-based Tibet Museum to design, through the management of traditional museum exhibits for Way, we can establish managed meta data of the prototype, and by increased demand function. Managed data given in the main consideration is to search for information that can be a variety of ways, and other information associated with the primary key, which in this study managed meta data, will interpret the file contents to be divided into building itself Basic information, the file management information and the collection of three types of management information units, according to China's Cultural Heritage Preservation Law and the establishment Digital Archives Program Table (4-1).

Table 4-1: Managed data given in the contents

Managed data given in the contents			
Basic information	Building Name	Building Code	Heritage Type
	Founded years	S style	Building Type
	Address and the location	Management unit	Affiliated people
Archives	File Name	Profile Theme	File No.
	Output mode	Filing date	Authors
Collection Information	File Name	File location	Contributors
	Accession Date	File Type	

4.3.2 Description for information

Mainly to provide content to the user for a better understanding of the file, which can be divided into the data according to the reproduction of the object (body building) and for the reproduction of carrier The information described in architectural description of research on content analysis Keyi out the required fields, the file description on the Keyi copyright, and other information to establish the purpose of the establishment as shown in Table 4-2.

Table 4-2: Description for information

Description for information			
Building Description	Designers	Features	Cultural activities
	Economic activities	Related activities	Related information
	Associated People	For the main	
File Description	Creator	Creation Units	Use style
	Top items	The lower object	Language

4.3.3 Technology-based meta-data content

Technology-based meta-data, taking into consideration the application of information, the process of preservation of cultural assets, may be because of work processes, the increase in additional meta data fields, this type of metadata to aid preservation of principal, additional Different areas of information technology to the common techniques for the measurement, research-based information in Table 4-3.

Table 4-3: Technology-based meta-data content

Measurement	Layout	Range	Site Area
Technology	Object area	Object number of groups	Earth coordinates
Research	History	Damage years	Renovation years
	Save Status	Material	Production methods
Government Notice	Notice Date	Login reasons	Act according
Information	Authorities		

4.3.4 Long-term preservation of meta data content type

Digital technology advances, forcing the data a multiple of the growth in the huge amount of data fast-growing pressure, the digital information preservation issues even more urgent, so that information can not be long-term preservation of the reason for most of the computer technology development, digital technology updates , Carrier vulnerable, data is modified, updating and other issues, so for the digital archive metadata build, needed to consider how to make information on long-term preservation, to Jordan to preservation metadata is defined as "describes the digital archive contains historical information ", Contains provenance, authenticity, preservation Activity, technical Environment, rights management ,and the study over a long-term preservation type of metadata as shown in Table 4-4.

Table 4-4: Long-term preservation of meta data content type

Long-term preservation of meta data content type			
Archives	Reason for Creation	Save method	Save
	Use of technology	Related Software	Store information
Development environment	Known System Requirements	Hardware Requirements	Responsible authority
Version Information	Custody History	Edit info	Agency
	Version	Rights Management	Related Information

5   XML DATA MANAGEMENT

The main shortcomings of the past, the lack of XML database management functions, and thus management of the surface, still need to import the database the way through the building, common way for the following three types:

5.1 Decompositions into relational database

Decomposition method into a relational database defined mainly through the xml and relational database mapping rules, the xml file is split into several components of the relational database stored in different form, as required by the query language used in the Be combined into XML, this approach can quickly handle the contents of the XML file fixed, but for more complex content of the file with the class more difficult than that.
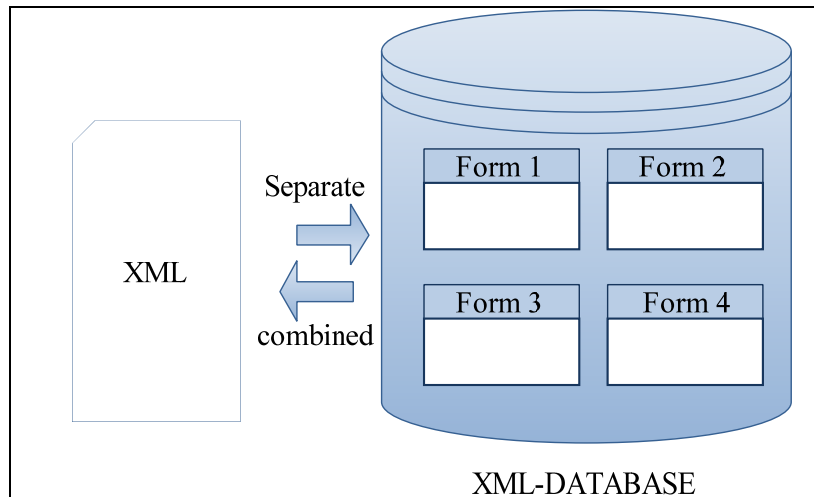
Figure 5-1: Decompositions into relational database

5.2 The large fields into a relational database approach

To complete a non-hierarchical XML into relational database to large object (LOB), do not break down for data movement, can be input and output, but changes in the data is more trouble, all the data required Export so it can not change and more complex classification.
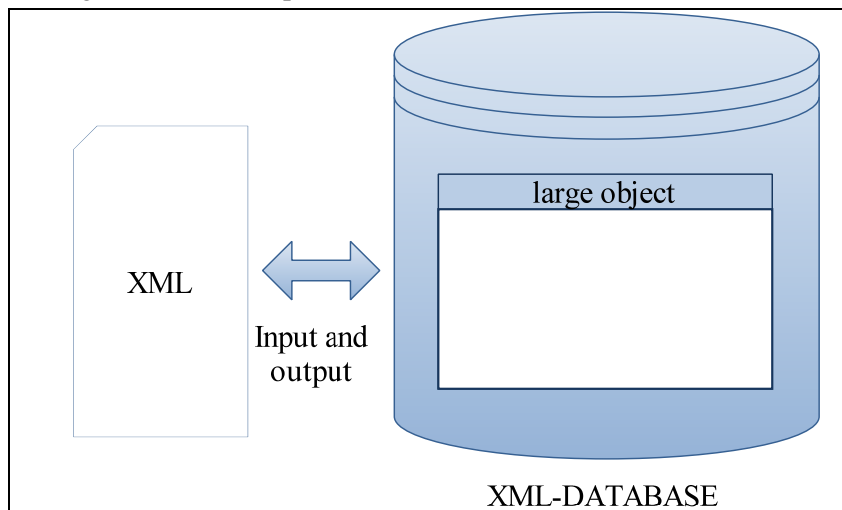

Figure 5-2: Large field into a relational database approach

5.3 native XML database

XML in general and the rise, XML database management forms have changed, the trend toward native XML database, primary database is defined as the data storage format, fully in accordance with XML data in hierarchical structure, stored, that is, the whole XML documents stored in the database, deposited by the process of decomposition and no particular specification of the way, directly through the native XML database, fast read and management of complex metadata
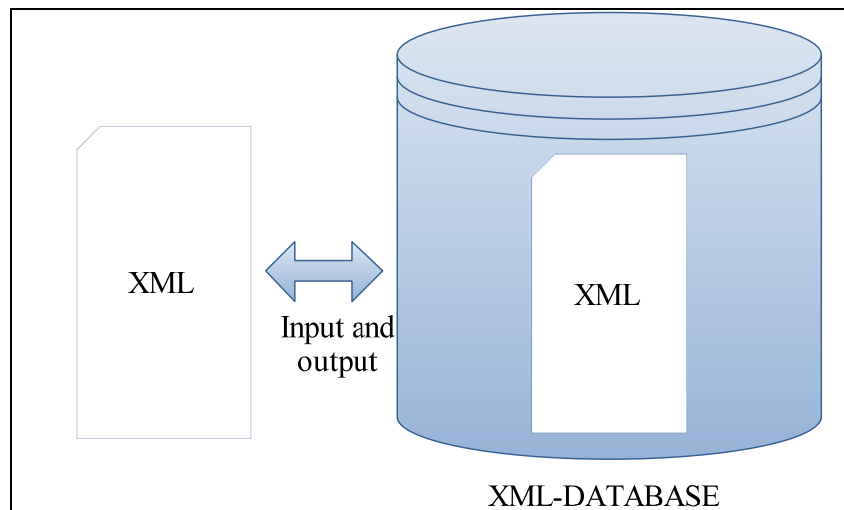
Figure 5-3: native XML database

Above for the three common XML database approach, a variety of databases for data management model can be, the choice is to use the functional requirements, this research field through large-scale relational database into the instance of the way through the XML for Digital data management.

6. RESULTS - TAIPEI COUNTY DIGITAL ARCHIVES PROJECT CONSTRUCTION

6.1 From the edge of planning

The research center in 2007 and 2008, to apply through the National Science Council, "National Research Program", based on the preservation of cultural assets for the purpose of 52 monuments in Taipei County for collection, this project is "Digital Taipei County Building Code Possession of plan."This study used laser scanner as the measurement tool, using laser and from the time difference calculable two were between the distance by the laser beam projection angle obtained by space coordinates, and the point cloud form of record presents, then Back-end digital processing, to achieve the collection and use advanced features. This project, a breakthrough for the management of technology issues, how to exchange XML-based file format, integration of the sustainable development of multimedia and Web 3D object format.

These questions have preliminary results in 2007. Full presentation of the program site plan results, via xml interpretation techniques, in addition to the visual design to show the coexistence of history and modern style, but also possessed functional to provide clear navigation mode, tap the audience want to watch the rapid Content, but also can appreciate the structure of the Taipei building monuments and historical background development of information and resources to provide integrated services.

6.2 Image Management monuments

Construction of the Institute of Image Management monuments, historic buildings under the main task of the metadata (Metadata), and the collection of digital data after the development of information retrieval system that allows Internet users to search the archive to the desired Information. As the number of digital archives to accumulate and may continue to grow, making browsing and more and more difficult than the data, so I hope this project can be developed by the information retrieval system to provide a more friendly interface to help Visitors looking for the necessary collection information.
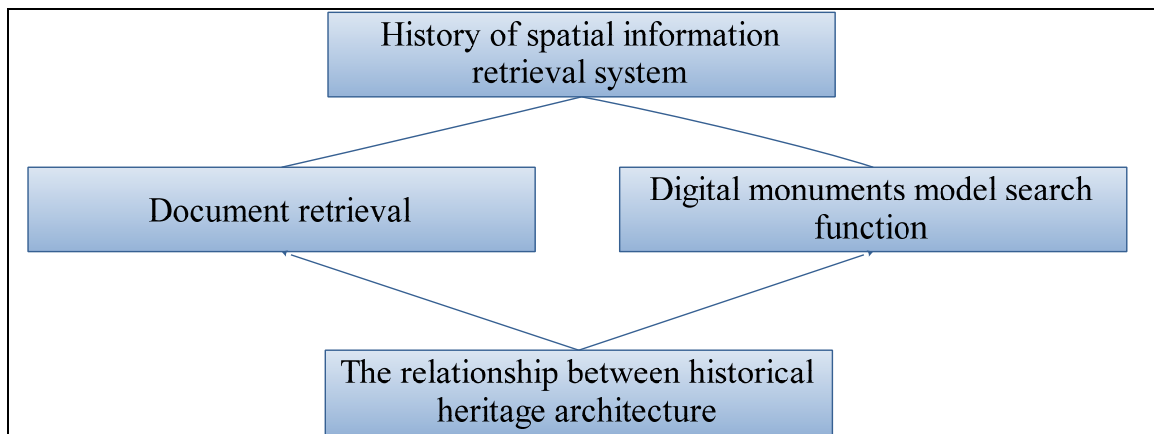
Figure 6-1: Information retrieval system function

The index for digital content, the main function is to provide collections users can search the external physical information compared to the required collection of user selected content. In this project, information retrieval systems, the external physical information collections will be stored in meta data, then metadata will be based on the name of each point of collection, age, type, material, style to be recorded to provide Query retrieval system used (Figure 6-2).
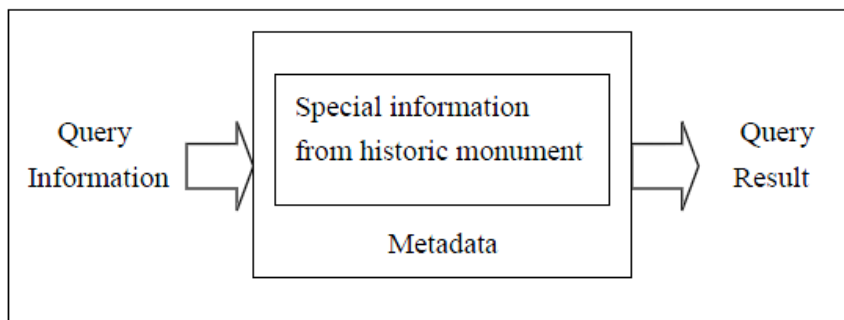

Figure 6-2: The metadata-based retrieval framework

6.3 Digital content associated with the establishment of inter-

This project specifically the relationship between data objects (Relationship) is defined to describe the relationship between the collection of information, provide search auxiliary function, the standard search function that can compensate for the fragmentary results, and provide a more systematic The search service. For information on the relevance of objects derived from the relationship between our two aspects of semantic relation with the discussion.

6.3.1 Derivative relations

Relationship is derived from historical data in the same, as presented in different styles, so the system will be considered as different data objects, this show's style may be differences in the size of the resolution, a front view of a historical heritage, Side view, top view, etc. or by different people to explain the same paragraph, so between these different data objects, with historical data derived from the same relationship.

6.3.2 Semantic relation

Semantic relationship is historical data in a different relationship between, for example, the portrait of a historical figure may include different periods or different portraits of portraits painted by the artist, but essentially the same portraits of historical figures, so the definition of the corresponding Semantic relations, the search function allows users more flexibility and diversity.

6.4 Results show

6.4.1 Quick Pick query mode

The study concludes that the user query fields most frequently used as a basis for fast selection query, including the monument name, grade, category, and the townships and other fields, users need only one field for the selection of a classification of interest , The system will filter out the data match the query, for example, users select the county level category set, the system will automatically filter out water Fort San Domingo, Lin Family Mansion and Garden, etc., to provide further browsing users (Figure 6-3).

Figure 6-3: Quick Pick query mode

6.4.2 Search mode

In this study, in order to provide users a more complete and accurate information, especially the establishment of the full-text retrieval system allows users to check with the quickest and most convenient way to find the most extensive results. In the full-text search mode, the user can enter any word related to the query, the system to accurately compare the full text of rapid screening of all the meta data database content, and the results of the relevant information listed in the system screen For further user selection of the output screen (Figure 6-4, 6-5).

Figure 6-4: Search - Filter results list

Figure 6-5: Search - Detailed text

6.4.3 Photo Tour Mode

The image search in order to facilitate users to find information on the way to gates, particularly in planning the graphic navigation mode, the user can select pieces of historic buildings and monuments of photos and quick to understand the historic building location information (Figure 6-6), the user can enlarge a photograph in detail (Figure 6-7), in order to achieve these functions, this study can be combined with specially developed geographic information Google Map API interface, this interface with Electronic maps and satellite aerial photographs, the user can clearly understand the historic streets and buildings surrounding

geographical environment, allowing users to understand the historic building from the point of the range extended to the surface (see Figure 6-8).

Figure 6-6: Photo navigation interface

Figure 6-7: Photo browsing interface in detail

Figure 6-8: Google Map API GIS interface

7. DISCUSSION

7.1 Conclusion

Through the Meta data we can know more clearly the source of the preservation of image data, currently with the instructions. Metadata created in the process, each element requires a uniform definition, the definition of cultural content need to discuss the purpose of data retention, the study by the Cultural Law, Construction Diversity Resources in Taiwan and Digital Archives Program Guidance account Paintings and digital archives related technologies, the definition of the above elements, the elements which may be through the digital archives of DC with field survey and biodiversity resources of Taiwan Architecture and Digital Archives at the Cultural CDWA format of the total relevant links. After its wish to develop metadata ontology can be established and historic sites with A. B. Relevance to ensure long-term preservation of

information presentation C. supporting information and instructions.

7.2 Future Development

The future work of this study can be divided into the following:

A. Definition of elements to add more experts to explore, such as a picture-description, log on grounds of definition, historical style of painting grading. This study also shows that only 13 common elements, whether there are other elements to be added to through a more in-depth study.

B. The rapid development in technology, data may face scouring Fu and change how they continue to preserve this information to become the most to the subject of the future, such as the file format changes, and the changes of the law.

C. After the metadata for the application of the establishment and promotion, this includes data collection, data search and so on. The problems found in its application, may be assisted by metadata changes and new.

D. XML database technology, the core technology for data management, but also data communication platform, database technology, the demand for consideration for the energy unity. Future research to native XML database application based.

E. Meta data applications, due to consider how to assist all types of platforms and software, such as KMZ.

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