

# A research on the digital technology for the management and disaster prevention of heritages based on the integrity concept

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Under the guidance of the Venice Charter, 1964 and the World Heritage Convention, 1972, the idea of conservation has become an important universal value. In the 21st century the growth of globalization and the developing of new techniques lead the conservation to a wider research field. Based on the cultural value first idea, the digital techniques and the disaster prevention are main issues to help the conservation. On the other hand, the integration in different field is another important concept. According to this trend, this research provides an integrative working frame on the management and disaster prevention for the monuments. The management indicators, metadata and the presentation are the key issues of this frame.

**Key words:** *integrity, heritage, management, disaster, digital technique*

## 1. Preface

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According to this trend, this research provides an integrative working framework on the management and disaster prevention for the monuments. The key issues of this framework are management indicators, metadata and the presentation methods.

Through these review, this research identifies the concept of integrative conservation and studies the background of digital technology applied in this field. A database was set up to meet both needs of management and disaster prevention. Those instruments and metadata of information were considered. This takes a monument the Ji-ing temple in Taipei as an example for practice.

## 2. Concept of integrative conservation

The past experiences of conservation take more attention on the buildings restoration then the thinking of their value. In the risk prevention side, the international awareness and public participation are under construction. It's very common to take the existing fire rescue procedure as an application tool for monument.

The Venice Charter mentioned the integrity and authenticity. The region of integrity means the touch from different periods in a building should be respected.

In the 21st century, integrity has extended its content to the existing environment and the living style of people. Besides that, the cooperation within the stakeholders is a part of integrity as well. Such progressing process can be understood by The Washington Charter, 1987, some documents of cultural landscape and cultural route, The Xian Declaration, 2005, etc. There are two documents full of importance:

**(1) The Operational Guidelines for the Implementation of the World Heritage Convention, OG**

The first draft of OG was declared by the World Heritage Committee, 1976 and announced in 1980. There are 14 different editions during the past years. As a response to the globalization and the weather change, the ICOMOS published (The World Heritage List : Filling the Gaps - an Action Plan for the Future, 2004) and declared a new OG, 2005. The authenticity and integrity were first mentioned in this edition as the standard to evaluate the OUV. Article 89 shows

*“A significant proportion of the elements necessary to convey the totality of the value conveyed by the property should be included.”*

**(2) The Quebec Declaration**

The Spirit of Place: between the Intangible and the Tangible is the main topic of the 16th general assembly of ICOMOS, 2008. The Quebec Declaration mentioned that *“Intangible cultural heritage provides a richer and more complete meaning to heritage as a whole and it must be taken into account in all legislation dealing with cultural heritage and collections of objects.”* The declaration provided a circular thinking or an integrative framework for the conservation. In this framework, risk preparedness was a key issue of safe guarding of heritage.

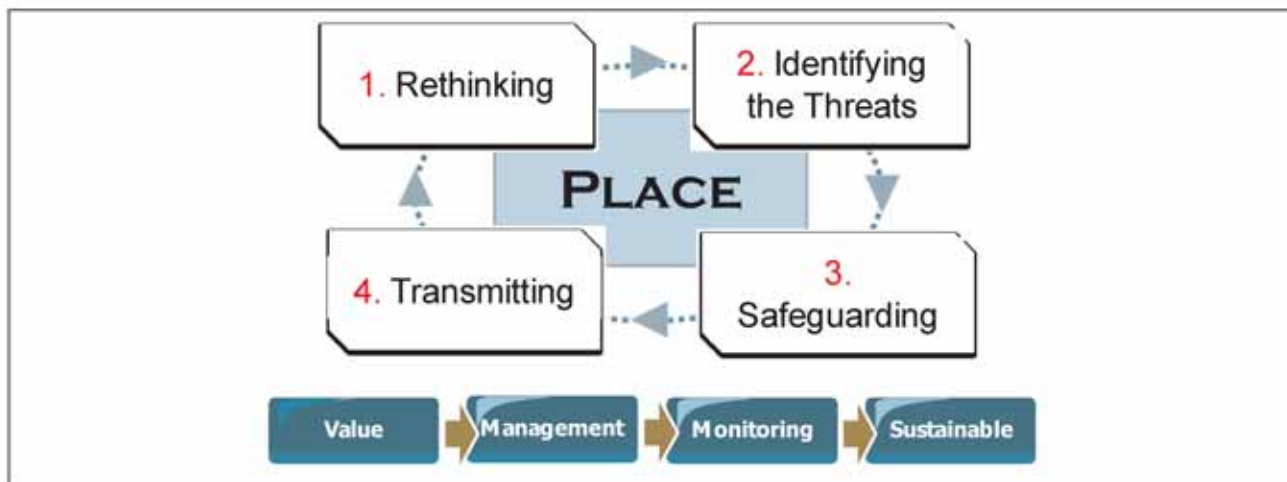


Fig1. Quebec Declaration, 2008

**3. Digital techniques and conservation**

The application of digital technology on the conservation is a new developing international trend. It focuses on using digital techniques in the field of recording, management, monitoring, education and presentation etc.

**(1) ICOMOS international scientific committee**

There are 26 international scientific committees in ICOMOS. In which the International Committee Economics of conservation, ISEC · the International Committee on Heritage Documentation, CIPA · the International Committee on Interpretation and Presentation, ICIP and the International Committee on Risk Preparedness, ICORP are close relate to this research. Fig.3



## (2) ISPRS and CIPA

The International Society for Photogrammetry and Remote Sensing (ISPRS)<sup>1</sup> was founded in 1910. The goals of ISPRS are to integrate various spatial techniques and promote the international cooperation. The recent main topics of ISPRS are: 3D Laser Scanner

- (a) Image data acquisition: sensors and platforms
- (b) Cyber city,
- (c) Direct Geo-referencing,
- (d) Visualization
- (e) Environmental monitoring
- (f) Disaster Prevention

The International Science Committee on Heritage Documentation, CIPA<sup>2</sup> was established in 1968 by ISPRS and ICOMOS. As one of the earliest international scientific committee of ICOMOS, CIPA had adjusted its orientation into digital technology recently. The research topics of the 23rd CIPA general symposium 2011 include:

- (a) Recording, documentation and information management of cultural heritage
- (b) Terrestrial/aerial photogrammetry and applications to cultural heritage
- (c) prevention of cultural heritage against risk/hazard
- (d) Web techniques regarding cultural heritage
- (e) Strategies for long-term archiving of digital information of cultural heritage

Both ISPRS and CIPA had mentioned the issues of risk management and monitoring. The integration within digital technology and risk prevention is becoming an international target of conservation.

## 4. Management frame

The article 88 of OG, 2011 describes that *“Integrity is a measure of the wholeness and intactness of the natural and/or cultural heritage and its attributes. Examining the conditions of integrity, therefore requires assessing the extent to which the property: a) includes all elements necessary to express its Outstanding Universal Value; b) is of adequate size to ensure the complete representation of the features and processes which convey the property’s significance; c) suffers from adverse effects of development and/or neglect.”*

This article showed the importance of management and monitoring to conservation.

The article 4 of the ( Format for the nomination of properties for inscription on the World Heritage List ) mentions the impact indicators and the condition of conservation. The article 132 of OG, *“An appropriate management plan or other management system is essential) ُ In the nomination format of world heritage article 6, the key issues of monitoring are (i) number of species, or population of a keystone species on a natural property; (ii) percentage of buildings requiring major repair in a historic town or district; (iii) number of years estimated to elapse before a major conservation programme is likely to be completed; (iv) stability or degree of movement in a particular building or element of a building; (v) rate at which encroachment of any kind on a property has increased or diminished.”*

The above documents describe the importance of sustainable maintenance based on an integrative concept. On the other hand, the conservation, management and monitoring are the key issues to precede the value of heritage.

### (1) Data and Database

To meet the diversity of cultural heritage and the management needs at different stage, a database should be designed according to their goals, purposes and the format of information.

The normalization of metadata is the key point in this process. This framework can provide added value such as KM, Interpretation and presentation of monument, etc.. Fig.2

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<sup>1</sup> ISPRS. <http://www.isprs.org/>

<sup>2</sup> CIPA. <http://cipa.icomos.org>

The management (phase III) in fig.4 is the main focus of this research. The data file of management and risk prevention is a part of total framework.

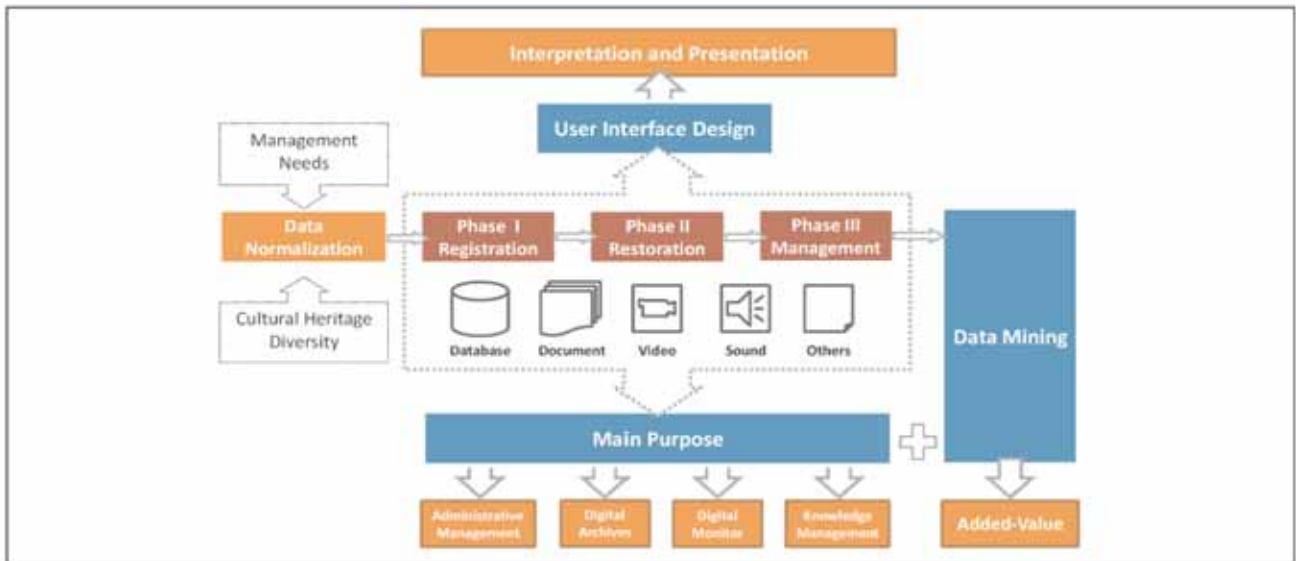


Fig.2 the database management framework of conservation (Yen, Weng et al. 2011)

**(2) A mobile management system**

In addition to the efficient performance of the framework above, a mobile management system was developed. Fig.3 :

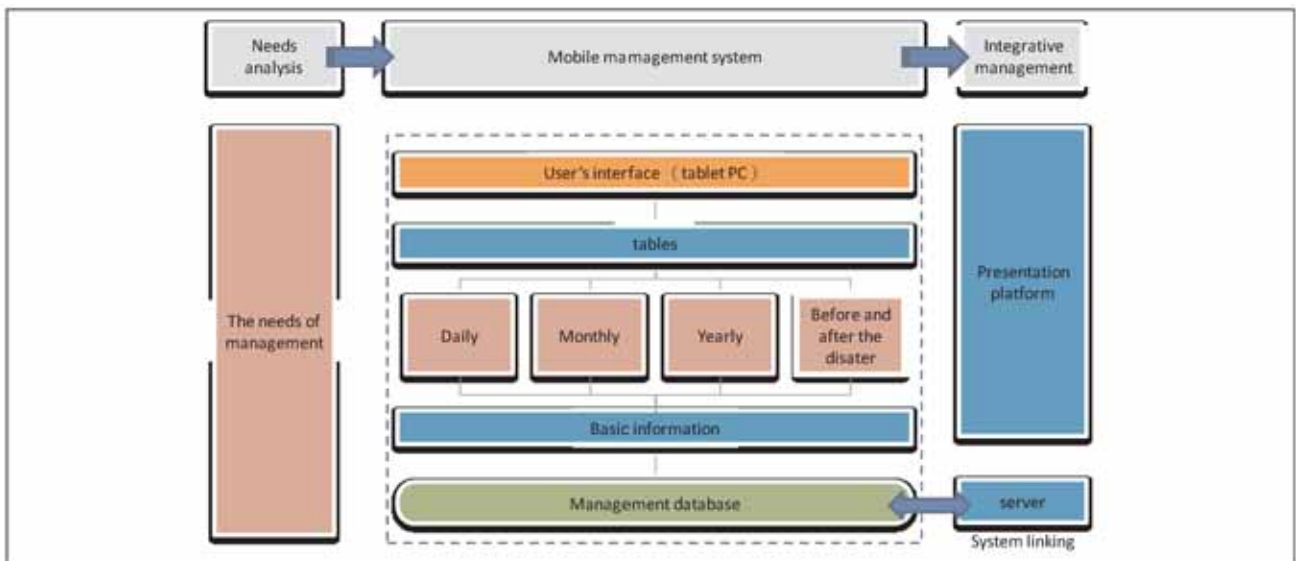
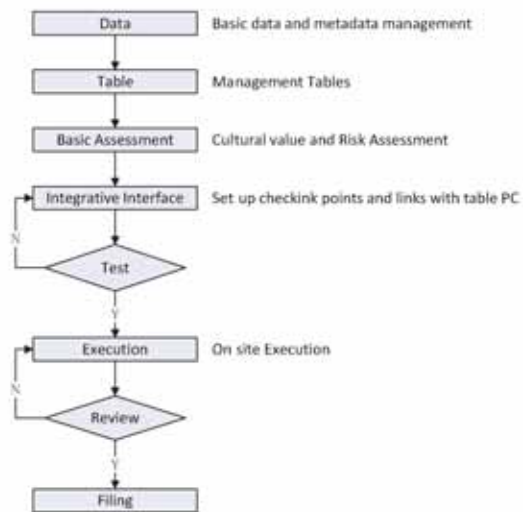


Fig.3 the concept of mobile management system

## 5. A case study of Ji-ing temple

### (1) Process and tools



### (2) The result



Fig.4 prepare the tools and set up checking points

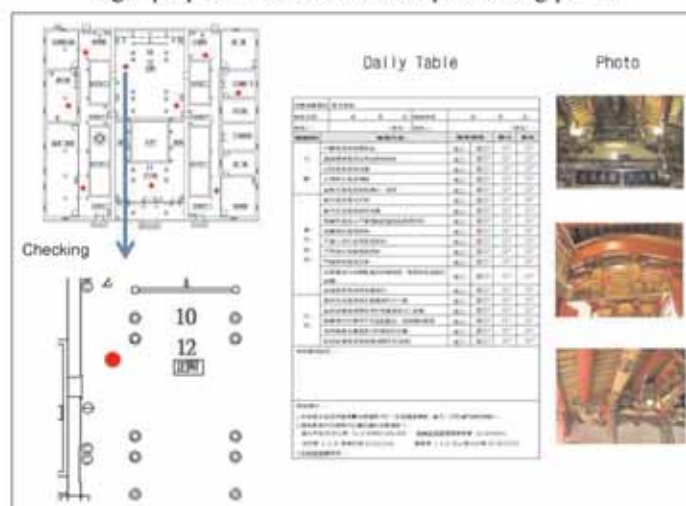


Fig.5 Checkpoint 1



Fig.6 Checkpoint 2

## 6. Conclusion

Through the case study examination, this study found this mobile system and the database framework are convenient and effective for the needs and providing a useful tool for the site managers.

There are some issues for the future research:

- (1) The integration of basic information and the Metadata
- (2) The completion of database and the communication in data files.
- (3) The education and training to the site managers.

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