The Application of Digital Integration Strategy for Cultural Heritage Conservation – the Case Study of Qionglin Settlement in Kinmen County

Alex Yen(✉), Wun-Bin Yang, Hui-Chun Chang, and Chao-Shiang Li

China University of Technology, No. 56, Sec. 3, Hsing-Lung Rd, 116 Taipei, Taiwan
alexyen@cute.edu.tw

Abstract. Integrated preservation is an important trend in the maintenance of cultural heritage, and borrowing value is the benchmark. Preserving the tangible and intangible value, counseling public participation and digital technology activation are all important tasks. In the process, mature digital tools are used for dating and assist to strengthen preservation work is an important key internationally at this stage.

This research takes the reconstruction of the historical site program- Reconstruction of Qionglin's Millennium Settlement History as an example to explore how to plan and individually introduce and integrate strategies for digital technology in each project.

The results of the study found that the introduction of digital technology into the sub-projects accelerate efficiency but also the effectiveness of the program. At the same time, the results of the program can be integrated through pre-planning and placed on the geographic information system (GIS) platform, fully interactive and efficiently.

Keywords: Cultural heritage · Digital integration strategy · Qionglin settlement

1 Introduction

More than 80 years have passed since the 1931 "Athens Charter" was issued. Many international charters and conventions have been proposed internationally, mainly focusing on the preservation, restoration, and maintenance of cultural heritage, supplemented by records for preservation and research. The "Quebec Declaration" adopted by the 16th General Assembly of ICOMOS in 2008 noted:

Considering that modern digital technologies (digital databases, websites) can be used efficiently and effectively at a low cost to develop multimedia inventories that integrate tangible and intangible elements of heritage, we strongly recommend their widespread use in order to better preserve, disseminate and promote heritage places and their spirit. These technologies facilitate the diversity and constant renewal of the documentation on the spirit of place.

In the same year, "ICOMOS Charter on the Interpretation and Presentation of Cultural Heritage Sites" also stated that "International cooperation and sharing of experience are essential to developing and maintaining standards in interpretation methods and technologies."

The digital technology of cultural heritage in practices, including the investigation and research of cultural heritage conservation, restoration design, operation management, disaster prevention monitoring and social education, as well as other stages of integration work, the public participation, digital learning, and value-added applications. The innovative management system should be integrated to further establish a cognitive business model based on a digital platform. This study takes the Regeneration of Historic Site Program in Qionglin settlement of Kinmen as an example. It enables tangible and intangible cultural heritage to obtain effective understanding, interpretation and added value, as well as sustainable inheritance, forming a complete cultural heritage preservation system.

2   The Process of Digital Technology Assisting the Preservation of Cultural Heritage in Taiwan

The early digital preservation in Taiwan was mainly used for historical materials, paintings and images in museums, and for the extensive preservation of flat objects; while cultural relics and antiquities were mostly preserved in physical objects, with little further involvement. In recent years, regarding the technology of digital preservation of cultural heritage, due to the trend of the International Charter for the Conservation of Cultural heritage and the widespread use of related technologies, Taiwan has gradually developed digital solutions for the preservation of cultural heritage. Through the use of different types of digital technologies, hope the complete preservation of tangible and intangible cultural heritage has opened a milestone in the digital preservation of cultural heritage.

In the past decade, the process of digitization has accumulated a considerable amount of digitization projects, but for such a wide range of collection projects, there is still a problem of integrated resources for cultural heritage projects. Cultural heritage is important knowledge inherited by predecessors, and are also important competitive assets and business opportunities in various countries. How to effectively apply them? The above international trends can see the blueprint for the preservation of cultural heritage in the future. In addition to the assistance of digital technology, it must also incorporate knowledge and research from different disciplines to achieve the integrity preservation of cultural heritage. Thus, the concept of "digital integration" technology is an important topic at present; only a good knowledge management policy can achieve the continuation and renewal of cultural heritage use. The digital application of cultural heritage refers to how to effectively apply the data after production and management to practice. The technology of digitizing cultural heritage has gradually moved from individual technologies to the concept of "integration" of data (Fig. 1).
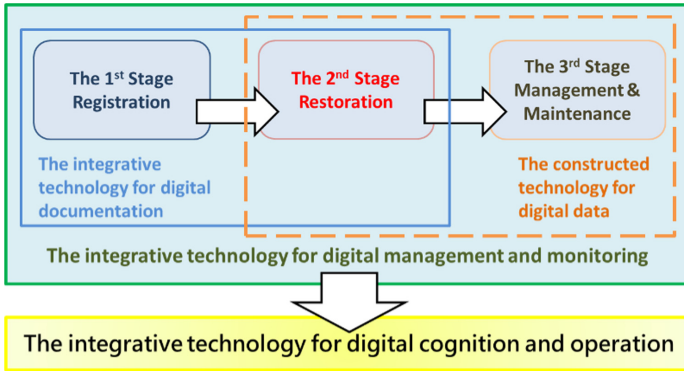
Fig. 1. Conceptual diagram of the integrative technology for digital cognition and operation.

3   Regeneration of Historic Sites Program: Reconstruction of Qionglin's Millennium Settlement History

3.1   The Launch of the Regeneration of Historic Sites Program

Taiwan's cultural heritage has been preserving since the promulgation of the Cultural Heritage Preservation Act in 1982. After nearly 40 years of hard work and accumulated experience, the Cultural Heritage Bureau was established in 2012, and Taiwan's cultural heritage preservation has also become more mature. Under the influence of international trends, the cognition of cultural heritage has tended to be diversified, and the interpretation and presentation of value are not limited to architecture and history. It requires the integration of multiple disciplines and departments and effectively presents the cultural heritage. The value of culture must be transformed from a single architecture to the concept of "sites" by effectively presenting the meaning and value of cultural heritage to the country, place, and people.

In order to further implement the Cultural Heritage Preservation Act, the Ministry of Culture launched the Regeneration of Historic Sites Program which selects 39 sites across Taiwan to benefit from the investment of 6.4 billion NT dollars since 2016. The Program aims to revitalize cultural heritage resources at a community level and also to regenerate the regional cultural landscape through public investment. It is promoted as a cultural citizen movement by including continuing community engagement and conversations to raise the awareness of cultural heritage conservation. In addition, the Program takes historical memory and the cultural context into account by considering the pluralistic imagination and uses of the heritage space. This leads to the reconnection of the contemporary community with heritage places through their involvement with cultural governance (MOC 2018). Based on the core concept of cultivating cultural development and increasing cultural engagement,

The program transcended conventional single-point, single-building, and case-by-case cultural heritage preservation methods and proposed the regeneration of historic sites as the central tenet for a public infrastructure investment project.

By combining cultural heritage preservation and regional spatial governance, this interdisciplinary program involving local culture, history, and culture technology combines the development plan of each ministry or comprehensive plan of each government, thereby connecting locals to the land and recalling relevant historical memories.

With the further deepens community development and promotes local culture residing in people's relationship with the local environment, strengthening culture connotations to boost the cultural economy. This program establishes a comprehensive cultural preservation policy involving both central and local governments, thereby applying culture preservation into civilian lifestyles.

At present, the Regeneration of Historic Sites (RHS) Program has twenty-two "onsite" projects to implement the integrative policy of local-culture-based conservation. The conceptual framework of the Program is shown in Fig. 2. This paper takes 'Representing the Glory of Thousand-year Settlement in Qionglin'- one of the RHS projects as the study case.
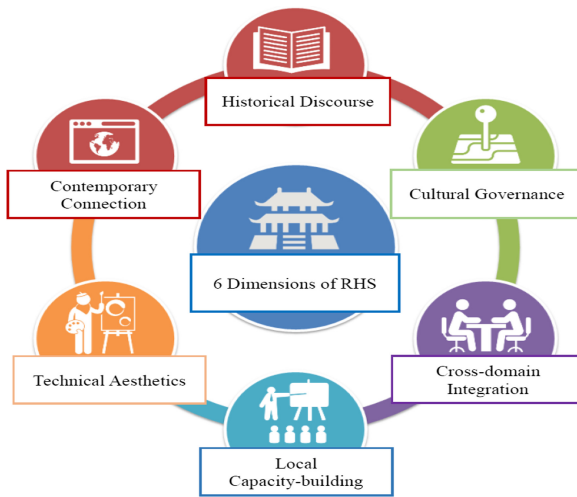

Fig. 2. The conceptual framework of the RHS program (www.rhs-moc.tw/).

3.2   Reconstruction of Qionglin's Millennium Settlement History

Qionglin settlement was listed as heritage in 2012; the local communities work together with the public sectors and scholars by proposing the "Qonglin Settlement Preservation and Redevelopment Plan" in 2013–2014. Based on the previous conservation works and the collective consensus, the "Reconstruction of Qionglin's Millennium Settlement History" program was preceded with 43 sub-projects from 2017 to 2021.

Background. Qionglin is a settlement with traditional clan culture at its core. It is situated within the Kinmen National Park. Qionglin is a highlight among the 150 traditional settlements of Kinmen because it conserves more than 400 traditional buildings while

also supporting a wealth of intangible cultural heritage values. The settlement reflects the continued conservation of the living culture of Southern Fujian culture including festivals and important folk traditions. The number of Qionglin's ancestral temples and the beauty of architecture are also crowned in the whole county (Fig. 3–5). The Qionglin ancestor's cautious pursuit of the ancestors is the example of "Living Minnan Culture". In 2012, Qionglin Settlement was designated as the historic settlement according to Taiwan's Cultural Heritage Preservation Act.

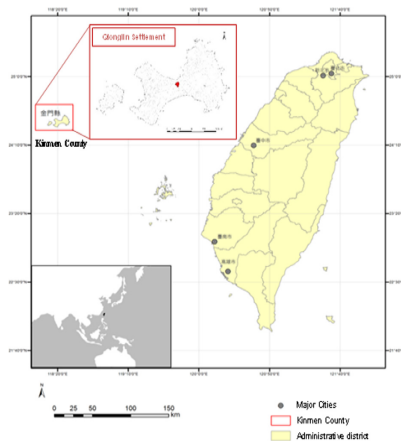**Fig. 3.** The view of Qionglin settlement.

Fig. 4. Location of Kinmen on the map of Taiwan.

Qionglin is a singly-surnamed Tsai village, beginning from the time that the Tsai Clan moved from Guang Zhou to Fujian, as far back as the Five Dynasties (907–960 A.D.). The residents all share the same family name–Tsai. It is apparent that the core for shaping the existence of Qionglin Settlement, including its historical development, the spatial composition, and the prosperity of Tsai families, lies in its clan-based traditions (CPRC 2017). Kinmen's clan-based culture adheres to Chinese traditional values handed down from ancient times and has been further nurtured by Southern Fujian traditions. Although like most of the island of Kinmen, it has been impacted by the diaspora cultures brought back by the returning emigrants and by a strong military presence, the village
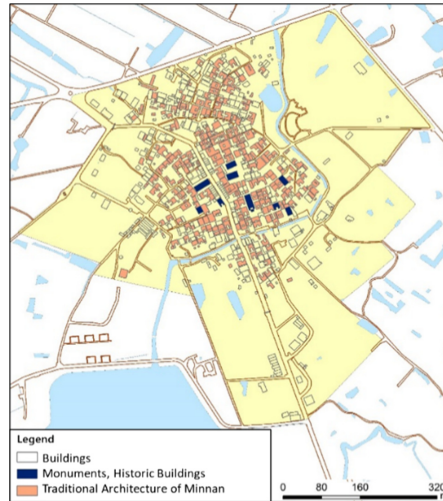
Fig. 5. The monuments and historic buildings in Qionglin settlement.

stands as an example of credible Living Heritage manifested by the architectural designs of the ancestral shrines, ancestor worship and other religious rituals, the organization and maintenance of lineages – each of which, in turn, is profoundly connected with the formation of the settlement texture and the life of its people. A farming-schooling-based tradition is advocated by the clan-based culture in the Qionglin settlement.

Objectives. In 2013–2014, combined with the participation of the public, a consensus was formed to complete the "Qionglin Settlement Preservation and Redevelopment Plan". In July 2016, the Kinmen County Government, in line with the cultural policy of the Central Government's "Reconstruction of Historical Sites Project", the Kinmen County Bureau of Culture proposed the "Qionglin Chua's Millennium Settlement Reproduction" project. The plan is divided into 4 years and the total funding is approximately US$ 6.93 million, the main goals are:

   Strengthen the investigation, research, and planning of cross-domain integration of cultural heritage in Qionglin settlement.

   Implement the participation of residents in Qionglin settlement and promote multiculturalism.

   Establish the integrity of the basic information and digital files of cultural heritage in the Qionglin settlement.

   Preserve intangible cultural heritage and folklore activity guidance and training.

   Develop the digital preservation of cultural heritage, and promote the establishment and navigation of historical space scientific and technological resources.

   Sharing the experience of rebuilding the historical site, and driving the preservation and activation of the Kinmen settlement.

   The execution conception of Qionglin's RHS Program (Fig. 6) is based on the diversification of cultural heritage values, the places conservation, the application of digital technology, and the connection between the tangible/intangible cultural heritage and the

grassroots. It aims to establish a cultural heritage conservation ecosystem by streaming cultural contents into the creative economy.
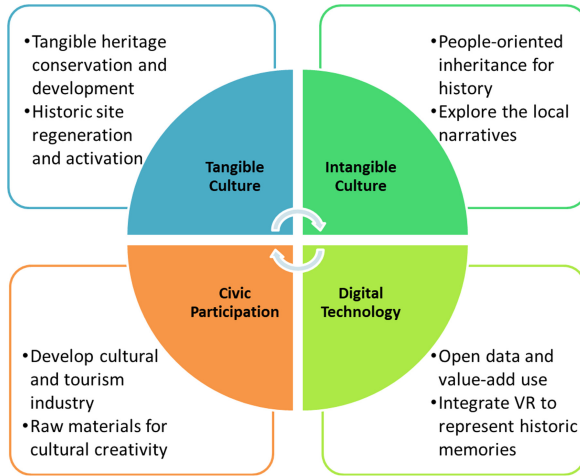

**Fig. 6.** The execution conception of Qionglin's RHS program.

The Program's Framework. The development of 'Reconstruction of Qionglin's Millennium Settlement History' integrates the previous heritage conservation initiatives as the foundation. The framework of the program is shown in Fig. 7. The sharing of experience is also part of the main tasks in the RHS Project. Besides taking Qionglin as the main object, it aims to extend the influence to other settlements in Kinmen.

4 Execution Strategy

4.1 UNESCO World Heritage 5Cs Strategic Objectives

By highlighting the value of Kinmen culture, this program will be based on the concept of world heritage described in "Operational Guidelines for the Implementation of the World Heritage Convention (2015)", and will discuss and discuss Kinmen's core value in depth. In 2007, the 5Cs strategy for the implementation of World Heritage Convention (WHC 2018) was promoted by the World Heritage Committee, based on the Budapest Declaration (2002's 4Cs strategy) by including the 'fifth C' for 'Communities' (See Fig. 8). This means that the integration of various government sectors and the community are recognized as an extremely important aspect of heritage conservation work. Heritage and Democracy was the main theme of 2017 ICOMOS General Assembly, emphasizing issues relevant to the communities impacted by World Heritage listings.

The execution strategy of this case is the implementation of concepts such as "bottom-up integration, cultural-based spatial governance", and integrates the concept of 5Cs strategy into this case. The content is explained as follows:
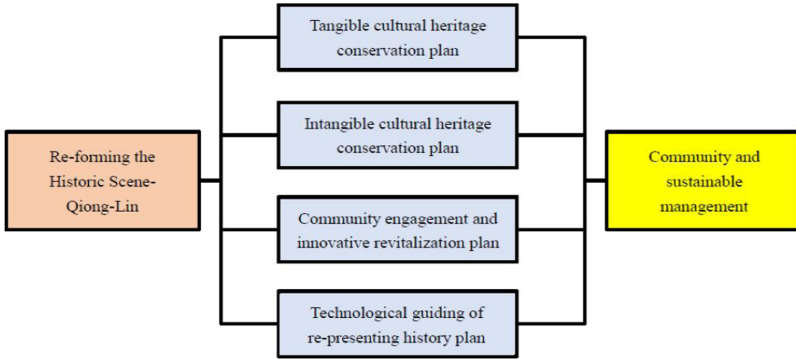
- Scene: Qionglin settlement, 8 national monuments, 400 traditional buildings, battlefield governance.

- History: 1600-year traditional settlement and living Southern Fujian culture

- Re-presenting: Ancestor worship in Qionglin, seasonal events and festivals, folk life

Fig. 7. The reconstruction of Qionglin's Millennium settlement history program's framework.
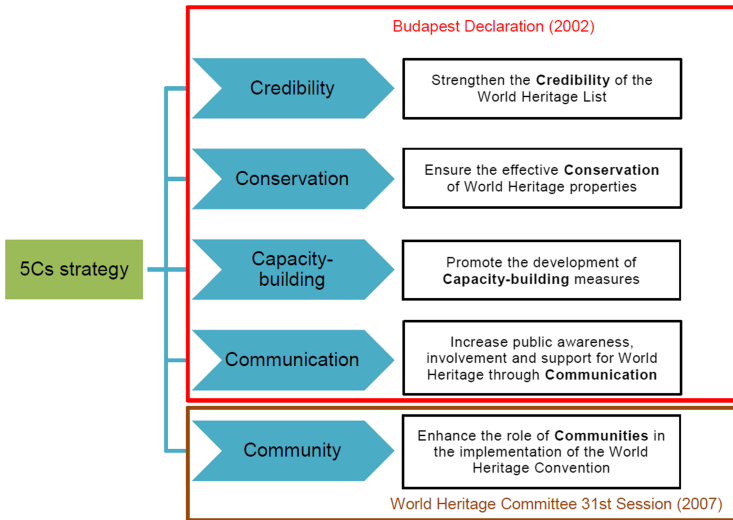

Fig. 8. UNESCO world heritage 5Cs strategic objectives.

Credibility. Complete basic research materials to support the development of related industries, cultural creation, tourism, talent training, and marketing.

Conservation. In addition to the protection of cultural heritage in the settlement, other software and hardware construction are also important tasks. Related work includes the

restoration and landscape renovation of traditional buildings, dilapidated houses, street houses and modern buildings in Qionglin settlement.

Capacity Building. It includes the preservation of cultural heritage is combined with school education and the curriculum is introduced; Integrated marketing and promotion of local cultural industry; and Training of local interpreters.

Communication. Actively communicate with Qionglin local NGOs and invite them to serve as consultants in this case. In addition to communication with the private sectors, the integration and coordination of the public sectors are also ongoing.

Community. It includes Qionglin settlement annual calendar and activity calendar; Local creation and identification support, encouraging communities from all walks of life to participate in the preservation, activation and value-added use of cultural heritage; as well as cultural heritage education and inheritance, schools are encouraged to handle cultural resources and environmental education activities and teaching plan design, inherit teaching, take root down, and continue to improve and popularize culture and art.

4.2 The Preliminary Project-in-Progress: Digital Interpretation and Presentation of Cultural Heritage Based on Knowledge Ontology

This case uses the ontology to establish the interpretation data of the life cycle of cultural heritage, including tangible and intangible cultural heritage data and based on the CIDOC CRM (CIDOC Conceptual Reference Model) as the foundation of the ontology, importing the contents of the current national cultural heritage database in Taiwan and establish a knowledge ontology model. The presentation platform uses the Arches presentation platform based on international interpretation data standards and combines advanced geographic information system functions to improve traditional database search and organization problems and enhance the relevance of data context. It is positive for the promotion of Taiwan's cultural heritage in line with international standards the meaning.

This Qionglin program team participates the Arches- an open-source software platform developed jointly by the Getty Conservation Institute and World Monuments Fund for cultural heritage data management. The Arches Platform is a comprehensive solution for data management, data discovery and visualization, and project/task management. The digital resources of Qionglin settlement are available on the platform since January 2020 (Fig. 9), in which shows the information of cultural heritage based on the concept of Cultural Heritage Lifecycle in different types, including the data of basic designated registrations, surveys, management-and-maintenances.

Digital technology for the conservation of cultural heritage has moved towards more diverse and different types of technologies, including data interception technology, data management, communication media and knowledge promotion, etc. In order to enhance the demand and presentation of cultural heritage value interpretation, the application of integrated digital technology and data content is the important key, and the integration results will promote the future development and value-added application of Qionglin settlement. Figure 10 shows the digital integration system for Kinmen Qionglin.
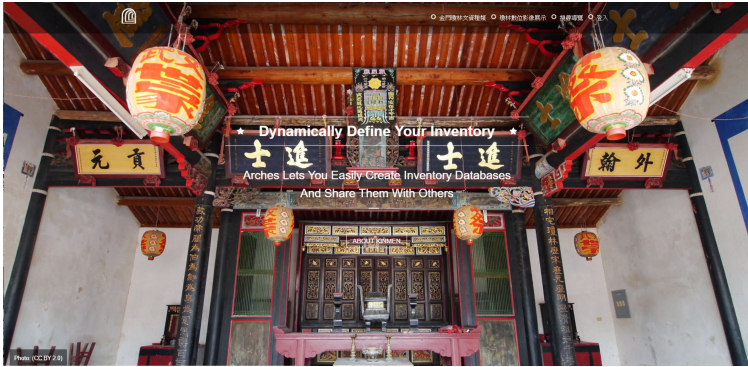
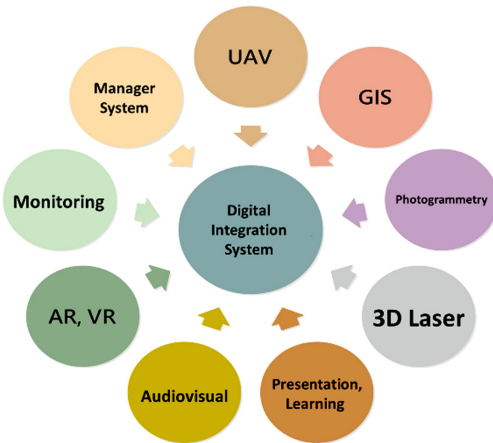**Fig. 9.** Kinmen Qionglin on the Arches platform (kinmen.cute.edu.tw/).

Fig. 10. The digital integration system for Kinmen Qionglin.

5   Conclusion

With the coming of the 21st century, a variety of well-developed new technologies offer a great addition to more traditional conservation and restoration techniques. At the same time, the development of Digital Technology not only provides faster and more accurate information to the record of cultural heritage (Documentation) but also advances the use of data; value-added applications (AR, VR, MR); and virtual classrooms taking access to best heritage conservation practice to an unprecedented level. The benefit of Digital Cultural Heritage (DCH) is now an essential issue that cannot be neglected.

It is an inevitable trend to use digital technology to assist in the preservation of cultural heritage. With the development of society and technological advancement, an integrated preservation structure is an inevitable trend. In the case of Kinmen Qionglin, the implementation mechanism of settlement preservation and redevelopment was established

based on the concept of World Heritage 5Cs, and the corresponding digital technology was also introduced. The results of the implementation found:

Digital technology is getting mature and universal. However, in the process of implementation, how to grasp the essence of cultural heritage and properly interpret and present them is an important key to success and effectiveness.

3D GIS can provide a platform for the integration and presentation of various digital data.

The format and standard of the data are still important issues in the integration of various digital results, especially when the data needs to be opened and exchanged. This work that is set by the country and shared with the world cannot be avoided.

At present, the work of reconstructing the historical site in Qionglin is still under implementation and is expected to be completed in August 2021.

Due to the gradual expansion of the scope and direction of development of cultural heritage, the required management and monitoring data are also multiplying. An integrated management platform should be used to achieve proper management. With the development of digital preservation concepts and technology, based on the concept of cultural heritage preservation and management, it is possible to achieve a common exchange of archive formats in the future. In terms of education, the application of digital integration strategy in cultural heritage should be widely promoted, and relevant materials should be provided to increase the awareness of cultural heritage conservation, such as public inquiry, action navigation, action management, management and maintenance application, disaster prevention and monitoring, 3D GIS dynamic information and other diversified enhancements. Digital value-added platforms will make a broader contribution to the preservation, activation and reuse of cultural heritage in the future.

References

World Heritage Committee. Operational guidelines for the implementation of the World Heritage Convention. UNESCO World Heritage Centre (2008)

ICOMOS. The ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Sites (2008)

ICOMOS. Québec Declaration on the Preservation of the Spirit of Place (2008)

ICOMOS. The Athens Charter for the restoration of historic monuments (1931)

WHC, World Heritage Centre. The 'fifth C' for 'Communities', (2018). https://whc.unesco.org/en/decisions/5197/. Accessed 2 July 2018

MOC, Ministry of Culture. The Information Counselling Platform for Regeneration of Historic Sites Program, (2018). http://www.rhs-moc.tw/index.php?inter=about&id=1. Accessed 2 Oct 2020