

## **Preface: Progress and Prospects of Research and Practice of Digital Cultural Heritage**

Anrong DANG

School of Architecture, Tsinghua University, Beijing 100084

Chair of 28th CIPA Symposium (CIPA 2021)

Co-hosted by Tsinghua University, ICOMOS China, Tsinghua Heritage Institute for Digitization, and Beijing University of Civil Engineering and Architecture, the CIPA2021 symposium (28th biennial symposium of the international scientific committee for documentation of cultural heritage) was held online successfully at Tsinghua University during August 28th to September 1st, 2021. This is the first time CIPA held a biennial symposium in mainland of China and in online format since its establishment in 1968. The theme of the symposium is "Great Learning & Digital Emotion". During the 5-day online symposium, opening ceremony & keynote-speech session-1, education session, outstanding youth forum, 12 sub-theme forums, and keynote-speech session-2 & closing ceremony were organized, which included 130 more presentations and attracted more than 1,000 online participants from more than 30 countries on five continents to conduct academic exchanges and seminars.

Among all the presentations, four of them are keynote speeches. These include: 1) "deep learning for cultural heritage" by Professor Christian Heipke (President of ISPRS), 2) "space technology in support of world heritage" by Professor Huadong Guo (Academician of Chinese Academy of Sciences), 3) "digital culture heritage and territorial spatial planning — China's practice and perspective" by Professor Jun Chen (Academician of Chinese Academy of Engineering), and 4) "documentation—foundation of any heritage policy" by Professor Teresa Patrício (President of ICOMOS). Besides these keynotes, all other 120 more presentations are selected from the publication papers of ISPRS Annals and Archives.

The progress and prospects of research and practice of digital cultural heritage all over the world can be summarized as theory, technology, and method of CHIM that will be described as follows. Basically, CHIM refers of Cultural Heritage Information Modelling. However, based on CIPA2021 symposium and the paper publications, CHIM is not just Modelling and Model, but the current progress and future prospects of digital cultural heritage research and practice, such as "C" represents Collection, Collaboration, Coordination, and Conference; "H" represents High-Speed, High-Quality, High-Tech. and High-Education; "I" represents Integration, Interpret, International, and Intelligent; and "M" represents Multi-Classes, Methodology, Multidisciplinary, and Management. And all of the aspects are included into the following table (see Table 1) and it is clear that CHIM is not only a Model for documentation but also a platform for future intelligent conservation.

Table 1: CHIM——Progress and Prospects of Digital Cultural Heritage

| Key Letter | Basic Meaning | Extension Meaning | Description of Progress and Prospects  |
|------------|---------------|-------------------|--|
| C          | Cultural      |                   | Focus on integration of tangible and intangible  |
|            |               | Collection        | Collecting cultural related data and information   |
|            |               | Collaboration     | International collaboration for conservation   |
|            |               | Coordination      | Coordinating in design, development, and action  |
|            |               | Conference        | International communication like CIPA symposium  |
| H          | Heritage      |                   | Architecture, Village, City; Point, Linear, Regional   |
|            |               | High-Speed        | Must be act at once because of many kinds of risks   |
|            |               | High-Quality      | High-Precision of cultural heritage data, model, interpretation, restore, system, and so on              |
|            |               | High-Tech.        | Application study on technology, like HBIM, GIS, RS, GNSS, XR, DL, Eye Tracker, Robot, and so on         |
|            |               | High-Education    | International training of digital cultural heritage  |
| I          | Information   |                   | From data to information to knowledge to intelligent   |
|            |               | Integration       | Integration of all kinds of data and technology  |
|            |               | Interpret         | Interpret the value system of cultural heritage  |
|            |               | International     | Recognize and conservation the value of cultural heritage from an international perspective              |
|            |               | Intelligent       | Mining the knowledge and intelligent from cultural heritage by deep learning and artificial intelligence |
| M          | Model         |                   | Integration of 2D/3D/4D model and its attributes   |
|            |               | Multi-Classes     | model cultural heritage requires the integration of multi-types, multi-scales, and multi-elements        |
|            |               | Methodology       | Technical approach to model cultural heritage  |
|            |               | Multidisciplinary | Digital cultural heritage conservation requires multidisciplinary integration                            |
|            |               | Management        | Digital cultural heritage conservation requires intelligent management and governance                    |

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Anrong DANG  
Tsinghua Yuan, Beijing, China  
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