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HERITAGE

Report on the OurWorldHeritage #2021debate

Transformational Impacts of Information Technology

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Report prepared by OWH IT Policy Committee
secretariat@ourworldheritage.org

TRANSFORMATIONAL IMPACTS OF
INFORMATION TECHNOLOGY
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Executive Summary

This report on the transformational impacts of information technology documents the activities carried out as part of OurWorldHeritage #2021debate. The application of information technology holds great potential for enhancing the protection and conservation of World Heritage sites and for mobilizing a global network of communities and civil society. The digital revolution is changing the ways in which people know, understand, use, and visit heritage sites. Significant opportunities exist to explore new digital technologies that could have a transformational impact on the management of World Heritage sites and improve knowledge-based decision-making.

The IT team chose to focus the debate on two topics that are particularly significant for these sites: monitoring and interpretation. In order to engage a global network of organizations and individuals and to deepen an understanding about how information technologies can support World Heritage sites, three global webinars were organized to include participants across all time zones. In addition, the team organized a Global Competition to highlight transformational uses of technology that increase community engagement in the monitoring, interpretation, and presentation of World Heritage sites.

The report contains a series of proposals on how to improve the protection, conservation, and management of World Heritage sites using digital technologies. Organized in three parts, the recommendations begin with a proposal to post an online catalogue of currently available digital resources, followed by seven suggestions for action by diverse players focused on: digital tools, capacity-building programs, guidance documents, a code of ethics, a networking platform, an exhibition, and a long-term vision for an interactive online platform. The report finishes with specific ideas on how to update the *Operational Guidelines for the Implementation of the World Heritage Convention* to improve requirements for nominations, state of conservation reporting, site interpretation and the involvement of communities and civil society.

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OurWorldHeritage

Who we are

Our World Heritage (OWH) initiative launched on the 16th of November 2020 as a global call for action to renew the spirit of the World Heritage Convention and, by doing so, advance the protection of Earth's natural and cultural treasures.

Initially composed of citizens from over 50 countries, this coalition of committed individuals is constantly expanding to include an ever-widening mosaic of heritage actors coming from civil society, site managers, activist groups, academia, industries and local communities. We are focused on how heritage can work as a solution and open opportunities going forward.

After a successful launch, the initiative is now in a process of knowledge building, essential to identify the exact issues that the World Heritage system and properties are facing today and to consider corresponding solutions. The 2021 monthly open fora provide OWH with diverse inclusive voices, engaged in cultural, mixed and natural heritage. Through the debate findings, OWH aims to create an impact on the implementation of the Convention through actions aligned to knowledge gained, such as putting heritage in the life of the communities, shaping and applying monitoring tools, information repositories and partner networks.

Mission statement

Our main mission is to raise awareness about, and address the challenges that, the World Heritage Convention is currently facing in order to maintain its relevance and ability to protect our heritage for the next 50 years.

Since the ratification of the Convention in 1972, the world has undergone dramatic changes, such as: climate change, social transformations, conflicts, new information technologies, and unsustainable tourism. These changes are putting pressure on an institutional apparatus that was already straining under its success and world-wide popularity, thus increasingly preventing it from completing its original mission of ensuring the "identification, protection, conservation, presentation and transmission to future generations of cultural and natural heritage" (World Heritage Convention, Article 4).

Indeed, the lack of civil society involvement and the prioritisation of the listing over the protecting of heritage sites are both symptoms of an institution that is at risk of losing its global credibility and in need of renewal.

Our approach

In order to revive the original spirit of the Convention and reinstate Article 5 as its focal point, OWH works as an integrator in many ways, by linking together different:

- **Themes**: promoting intersectional discussions as well as fostering non-binary, holistic, and multi-disciplinary policies;
- **Regions**: integrating effective participation and dialogue in World Heritage activities and ensuring balanced geo-cultural and bio-regional representation;
- **Generations**: encouraging intergenerational participation and making present and future heritage conservation practices more sustainable;
- **Narratives**: providing a broad platform for dialogue, based on mutual respect, active listening, and co-learning to add multi-dimensionality to mainstream representations with respect for diverse cultures and belief systems;
- **Practices**: encouraging and influencing reform in World Heritage implementation processes as well as fostering informed and knowledge-based decision-making;
- **Actors**: systematically involving civil society and fostering a global partner network, thus achieving more transparent practices and improving accountability;
- **Levels**: facilitating communication between local, regional, national, and international levels of heritage governance to promote a conservation model that goes beyond the boundaries of World Heritage sites.

2021: A Year of Thematic Debates

As part of this knowledge-building process, each month of the year 2021 addresses a particular theme that reflects one of the contemporary challenges that the World Heritage Convention and all types of heritage face today, with the dialogue outcomes seeking to aid in resolving issues, sharing positive results, and exploring opportunities for heritage to bring forward solutions:

January: Information Technology
February: Tourism and its Impact on Conservation
March: Diversities & Genders
April: Human Rights
May: Disasters & Pandemics
June: New Heritage Approaches

July: Sustainability
August: Climate Change & Biodiversity
September: Heritage Places & Memory
October: Heritage in Conflict
November: Beyond the List
December: Opening up to Civil Society

Committed volunteer coordinators and conveners build a team of volunteers, organising online events together throughout the month. These global events, open to all, provide a platform to share information and experiences while identifying issues and highlighting opportunities.

Noting the inherent interrelationships among the themes, each team prepares an individual report, with parallel contents, as set forth in this document. Taken together, these twelve theme reports create a comprehensive analysis of the 2021 process, findings, and outcomes. An analysis of the content and data surrounding each event provides a foundation to recommend actions on crucial topics such as governance structure, representation of diverse heritage, collective responsibility, credibility and vitality of the World Heritage system and properties, as well as its effect on the protection of heritage worldwide. The uses of this compilation are varied, which include informing next steps and presenting on the occasion of the World Heritage Convention's 50th anniversary in 2022.

I. Introduction to the Theme

1. Specific Theme and Goals

Within the overall goals of the OWH initiative, the field of information technology holds great potential for contributing to the protection and conservation of World Heritage sites and mobilizing a global network. The digital revolution is changing the ways in which people know, understand, use, and visit heritage sites. Unfortunately, the World Heritage system has not always kept up with this historical transformation.

The World Heritage Convention calls for an effective system of collective protection, conservation, and presentation of World Heritage sites using modern scientific methods. UNESCO's World Heritage Centre was an early adopter of digital communications that provided access to documents and online services. By the mid-1990s, it began posting documents of past statutory meetings, resolutions, decisions, committee reports, photographs, and mission reports at

https://whc.unesco.org/en/documents/. Almost 60,000 official records about World Heritage are searchable online, with new entries posted daily. In addition, since 2012, World Heritage Committee sessions have been webcasted live over the internet to audiences around the world. Today, the *Operational Guidelines for the Implementation of the World Heritage Convention* calls for submissions of nomination files in electronic format and encourages the use of the World Heritage Centre's online tools for periodic reporting and requests for international assistance.

Of the three technical advisors to World Heritage, the International Union for Conservation of Nature (IUCN) has made the greatest use of information technology to monitor the condition of species and ecosystems at natural World Heritage sites. Since the 1980s IUCN has used a global database for natural sites, hosted by the World Conservation Monitoring Centre (WCMC) in Cambridge, U.K. Founded in 1979 by IUCN, WCMC became an independent institution in 1988. Since 2000 it has operated as the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), serving as UNEP'S biodiversity assessment arm. Since 2014, IUCN has undertaken three cycles of conservation monitoring for its Outlook program. The results from 2014, 2017, and 2020 have created a database that monitors natural World Heritage sites. With a focus on threats to natural values and the effectiveness of actions to protect them, the IUCN's World Heritage Outlook program assesses the conservation prospects of all natural World Heritage sites. Information is available online at World Heritage Outlook (iucn.org) and in the report of the third cycle: https://portals.iucn.org/library/sites/library/files/documents/2020-035-En.pdf.

The International Council on Monuments and Sites (ICOMOS), the technical advisor to the World Heritage Committee for cultural sites, has no such databases at this time. It does have several international scientific committees (ISCs) that could potentially contribute to developing such a system, including the International Scientific Committee on Risk Preparedness (ICORP), the International Scientific Committee on the Analysis and Restoration of Structures of Architectural Heritage (ISCARSAH), and CIPA Heritage Documentation, which is a hybrid committee co-reporting to both the International Society for Photogrammetry and Remote Sensing (ISPRS) and ICOMOS.

The other technical advisor for cultural sites is the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), which has typically focused on capacity building. A recent experiment in building a bottom-up database is PANORAMA, developed as part of the ICCROM-IUCN World

Heritage Leadership program, in collaboration with ICOMOS and UNESCO. Launched in October 2020, a new Nature-Culture thematic community uses the PANORAMA platform to upload examples of good practice in heritage protection and management from around the world. The information comes from site managers as well as local and Indigenous communities. PANORAMA aims to be a space for heritage practitioners to share experiences and learn from their peers.

In summary, the current use of information technology focuses mainly on the distribution of existing information on World Heritage. With the exception of PANORAMA and IUCN, information comes from States Parties and experts with little opportunity for contributions from civil society and communities. Individual systems are stand-alone, not coordinated and integrated with each other in a holistic way. Finally, there are few real-time ongoing applications available, particularly for site monitoring. Significant opportunities exist to explore new digital technologies that could have a transformational impact on the management of World Heritage sites and contribute to better knowledge-based decision-making.

2. Specific goals of the theme

The current revolution in digital technologies is changing the ways sites are conserved and visited. As part of this historical transformation, new approaches such as collective knowledge and big data have the potential to become key tools in heritage conservation. Information technologies can provide a means to integrate heritage conservation within comprehensive planning systems, and can support transparency and accessibility in decision-making and management processes. Digital technologies, including social media, can provide platforms for heritage education, foster awareness of heritage sites, and provide support to the cultural and creative industries. Within this context, it is vital that site managers and others responsible for the creation and health of World Heritage sites keep pace with current developments and be in a position to mobilize information technologies to their advantage.

Against this backdrop, the key objective of the Transformational Impacts of Information Technology Theme (“IT theme”) was to establish a robust global network of organizations and professionals to discuss and formulate recommendations as to how information technologies can be used to support World Heritage sites. The IT Theme chose to focus on two topics that are particularly significant for these sites: monitoring and interpretation. The first topic considered how information technology could be used as a transformational tool

for monitoring change at World Heritage sites. What characteristics would be necessary for effective monitoring systems using information technologies? The second topic explored how information technologies could be used in transformative ways to provide interpretation for heritage sites, including the ability to present multiple or under-represented narratives about a site. How could effective interpretation systems be facilitated by using information technologies? Originally focused on generating policy suggestions for the World Heritage Committee, the IT theme has now formulated a more expansive series of recommendations that are directed at multiple audiences.

In deciding how to meet its objective of creating a robust global network for discussion, the IT theme articulated a series of principles: the discussion should be open to as many stakeholders as possible and include people in a wide range of roles in relation to World Heritage sites: site managers, citizens, government representatives, academics, etc. Stakeholders should be free to participate regardless of their location or time zone, and discussion should take place at the regional as well as international level, without prioritizing one region over another. Discussion should be available in multiple languages and stakeholders should be able to contribute their ideas through multiple means. The discussion should be structured to include both monitoring and interpretation topics and to consider both the natural and cultural aspects of World Heritage sites. Finally, any observations and policy suggestions should be circulated back to stakeholders for review and additional input.

These principles led to a series of three global webinars (Globinar 1.0, the Moving Forward webinar, and Globinar 2.0) and a Global Competition. Although the theme was assigned to the month of January, it was launched in November and events took place between January and April. “Globinars” were held in January (Globinar 1.0) and April (Globinar 2.0)—these 24-hour events were structured to include participants across all time zones and address regional concerns and languages. Each Globinar comprised five consecutive sessions held in separate time zones. The agenda for each session included keynote speakers from that region and breakout rooms on area-specific topics in a choice of languages, as well as overarching topics of concern to all zones. Globinars were free of charge and promoted widely through social media and other channels. Speakers included industry representatives, academics, site managers, and finalists in the Global Competition. Globinars were held using Zoom videoconferencing and featured interactive polling and word clouds, software for submitting and ranking questions, and a Miro board (an online whiteboard and collaboration platform)

that provided a visual map of the event. As well as responding to polls and contributing questions, participants could add comments to the Miro board throughout the event and afterwards. Rapporteurs took notes and summarized the discussions. All of this material was available for the policy team to formulate its recommendations.

The Moving Forward webinar was held in February 2021 and provided a bridge between the two Globinars. While also global in scale, it was slightly less ambitious, comprising two sessions in two time zones. It included a discussion of policy themes raised in Globinar 1.0, an industry showcase, and description of prizes provided by industry sponsors, announcement of the nine shortlisted teams in the Global Competition, and the launch of the mentoring ateliers for them.

The Global Competition was a call to intersectoral teams around the world to submit projects that showcased how citizen groups were using information technologies for monitoring or interpretation of World Heritage sites. The competition was launched in November 2020 and shortlisted teams were announced in February 2021. Members of the OWH IT team mentored the shortlisted competition teams throughout February and March, and winners were announced at Globinar 2.0 in April. The competition provided yet another means for input on the debate; competitors had the opportunity to present at the final Globinar and their submissions were used to craft the final recommendations of the theme.

3. Results Achieved

The Information Technology events (Globinar 1.0, Moving Forward webinar and Globinar 2.0,) and the Global Competition were effective in reaching a diverse global audience and obtaining useful input on how information technologies can be used to support World Heritage sites. They achieved the theme's goal of establishing a robust network of organizations and professionals, provided a venue for focused discussion, and led to the formulation of the recommendations contained in this report.

More than 800 registrants from 88 different countries participated in Globinar 1.0; 261 registrants from 61 different countries attended the Moving Forward webinar; and 272 registrants from 63 different countries participated in Globinar 2.0 (Figure 1). Overall, people from six continents and more than 100 individual nations joined the three events.

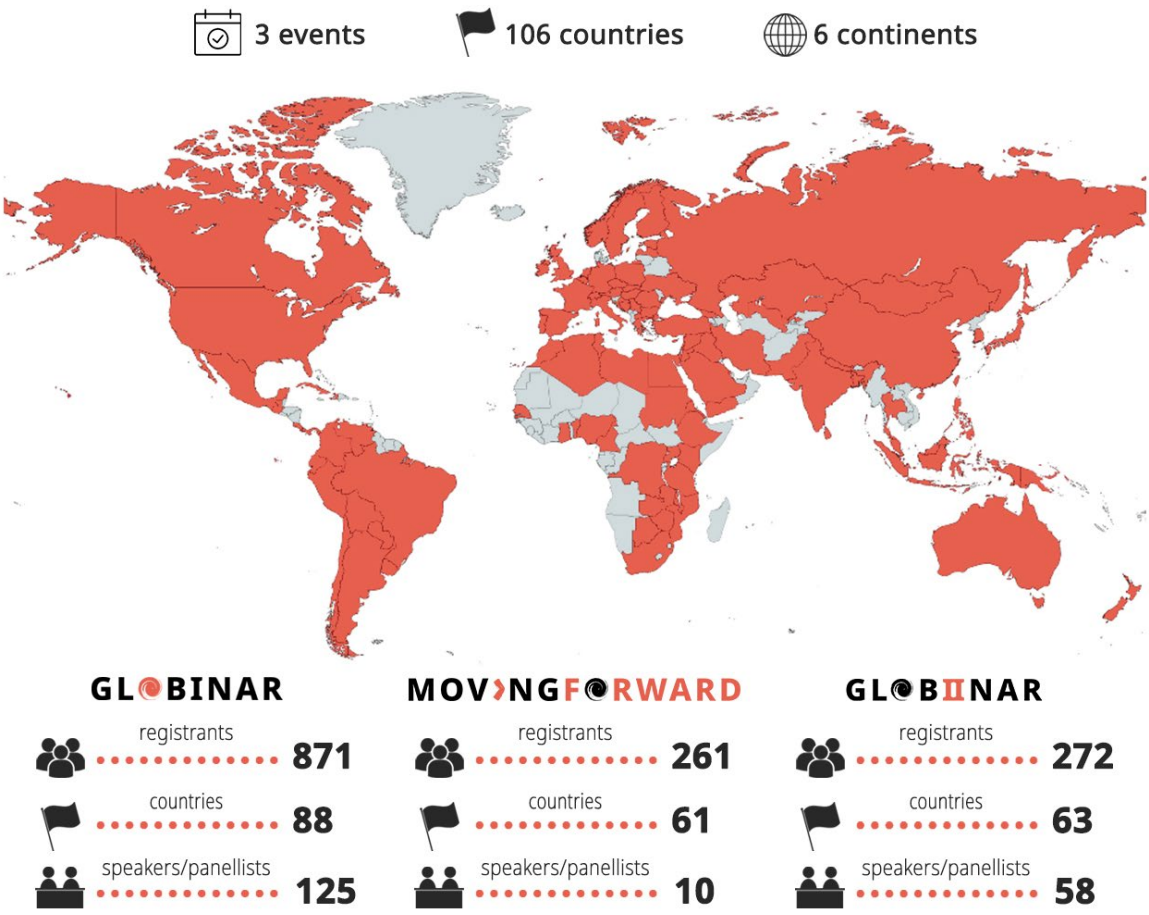

Figure 1: The OWH IT events had a global reach: world map shows the countries (in orange) from which panellists and registrants attended the three events. Source: OWH IT team, 2021.

Participants in Globinar 1.0 named the World Heritage site they are associated with: the word clouds created from their responses reflect the world-wide reach of this event (Figure 2).

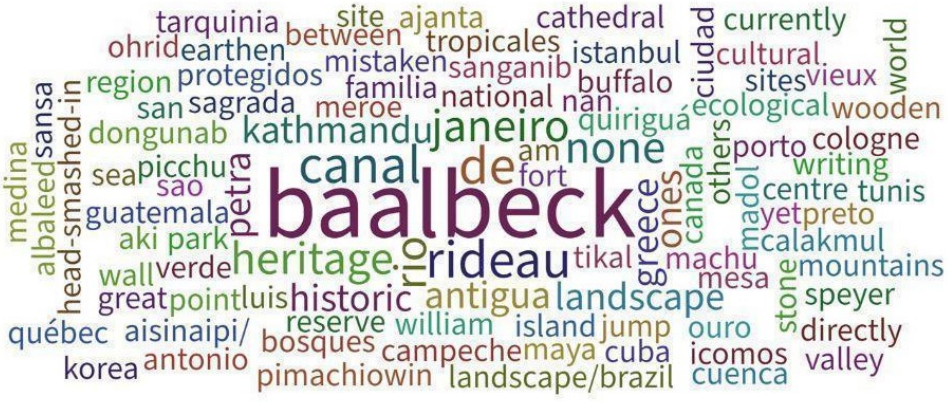

Figure 2: During interactive activities, Globinar 1.0 participants named the World Heritage site they are associated with – shown here is the resulting word cloud for Session 3. Source: OWH IT team, 2021.

Participants were asked for one key word to describe what they had learned from the session: the word clouds created from their responses reflects the optimistic and collaborative nature of Globinar 1.0 (Figure 3).

Figure 3: At the conclusion of Globinar 1.0, participants identified in one word, what they had learned or experienced. Shown here, the resulting word cloud from Session 2. Source: OWH IT team, 2021.

Panellists and participants discussed the use of information technology for monitoring World Heritage sites, including: GIS mapping and spatial analysis tools to combine data from natural and cultural sites; drones and satellite images for large-scale sites; photography; ultrasonic and infrared thermography; remote sensing; and photogrammetry. On the presentation and interpretation of World Heritage sites, panellists and participants discussed: applications for augmented and virtual reality; the use of digital technologies to improve site interpretation and generate revenue; and the need to bring together different technologies for effective storytelling.

Based upon the input during Globinar 1.0, the policy team prepared a list of key characteristics for using information technology for monitoring. At the Moving Forward webinar on 6 February 2021, participants were asked to rank those characteristics. The top three characteristics focused on information technology that: is appropriate to the specific needs, scale, location, and limitations of the site; takes a holistic approach to the culture/nature balance of the site; and is accessible, affordable, and practical. Still important, but not ranked as highly, were characteristics that it be kept current, follow ethical standards, and be interoperable across software and disciplines.

Participants overwhelmingly identified on-site training as the most important activity to build capacity in using digital tools. Other important approaches were intergenerational mentorship, a World Heritage toolkit, and online support.

When asked about their approach to creating an intersectoral collaborative network, participants created a word cloud that highlighted collaboration and inclusivity (Figure 4).

Figure 4: Participants in the Moving Forward webinar on 6 February 2021 were asked for a one-word response to creating an intersectoral collaborative network. Shown here is the resulting word cloud from Session 1. Source: OWH IT team, 2021.

Similarly, when asked for the next step for IT in World Heritage, participants named collaboration and teamwork (Figure 5).

Figure 5: Participants in the Moving Forward webinar on 6 February 2021 were asked for a one-word response about next steps for IT in World Heritage. Shown here is the resulting word cloud from Session 1. Source: OWH IT team, 2021.

Globinar 2.0 was focused on collecting and discussing existing examples of open data sources and software that could be used for monitoring or interpretation at World Heritage sites, as well as existing examples of capacity-building materials. Industry representatives explained the strengths and uses of various IT programs.

Participants at the Globinar, Moving Forward webinar, and Globinar 2.0 represented a diverse range of heritage sectors; less than half were from academia, with strong representation from nongovernmental organizations (NGOs), private sector companies, and individuals. Smaller numbers represented government or public organizations, site managers, and industry (Figure 6).

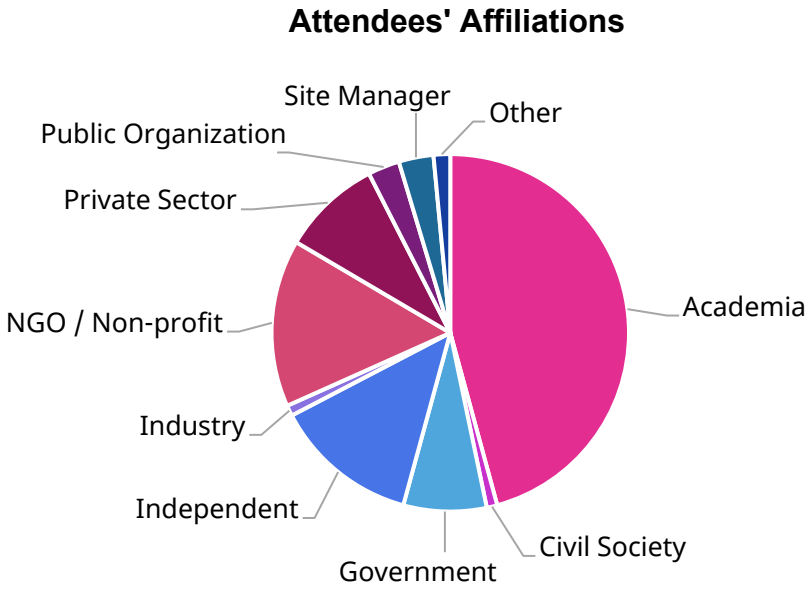

Figure 6: Participants at all three events (Globinar, Moving Forward, and Globinar 2.0) represented a wide range of backgrounds, with less than 50% from academia. Source: OWH IT team, 2021.

II. Considerations arising from the debate

1. Issues and opportunities that emerged in discussion on the theme

Following the discussions of Globinar 1.0, the policy team reviewed the extensive notes taken by the session rapporteurs to record the opinions and contributions of participants on information technologies in relation to natural and cultural World Heritage sites. The team organized these observations into six key subject areas, creating a policy framework that reflected the findings and provided a way forward. This framework was presented to participants at the Moving Forward webinar on 6 February 2021 for further reflection and refinement. For the following six subject areas, participants identified issues and opportunities:

1. What characteristics of information technology are needed for effective monitoring of World Heritage sites?
    - Technology should be appropriate to the specific needs, scale, location, and limitations of each World Heritage site and should be accessible, affordable, and practical. It must take a holistic approach to the cultural/natural balance of the site. Information technology should be interoperable across software and disciplines and have long-term sustainability so that it can be kept current. It must follow

ethical standards that protect the integrity of both the data and the natural/cultural assets at the site.

2. What should be the key requirements for digital tools to effectively present World Heritage sites?
    - Digital tools should be able to link tangible assets with intangible heritage. They must be able to connect stories with the aims, goals, and purposes of the site. Information technology should provide a platform that supports the telling of multiple narratives about the site and should employ multiple media to tell those stories. It must follow ethical standards for interpretation that protect the natural/cultural assets at the sites and the communities associated with the site.

3. How can data and information on site conditions be shared using digital tools?
    - An interactive, collaborative digital platform is needed. It should be an open-data platform that will enable users to share case studies, demonstrate how policies can be implemented, replicated, and scaled up, and support peer learning to build capacity.

4. How can information technology systems be managed in a sustainable way at World Heritage sites?
    - There should be common standards imposed for data collection and archiving. Stable operational funding should be provided for data storage, security systems maintenance, and updating. Strategies should be developed to keep systems current and policies should be reviewed at regular intervals to adjust to changing technologies.

5. How can we build capacity for using digital tools?
    - There should be on-site training in local languages, online support, and intergenerational mentorship. A World Heritage information technology toolkit should be developed and disseminated online that provides links to training opportunities, open data sources, and information.

6. How can information technology support intersectoral collaboration to conserve World Heritage sites?

- Strategies are required to build intersectoral networks, set common standards for participation in data collection and access to digital information, encourage interactive databases to support effective decision-making, and promote capacity building for digital literacy.

2. Links between the Information Technology theme and World Heritage needs

Throughout the three theme events (Globinar 1.0, Moving Forward webinar, and Globinar 2.0), participants raised connections between the Information Technology theme and the requirements of the World Heritage system. The debate pointed to nine areas where improvements could be achieved in the application of information technology to the conservation of World Heritage sites.

2.1 Time for Change

Participants expressed the need for fundamental changes in the concept of World Heritage. There have been major changes in information technology during the 50 years since the creation of the World Heritage Convention, and these should be reflected in the way World Heritage is identified and managed. For example, the arbitrary distinctions between culture and nature and between tangible and intangible heritage should be removed—information technology could be used to provide links between these aspects. In looking at the Outstanding Universal Value of World Heritage sites in a holistic way, information technology can connect all the values of the site – not just the specific attributes identified in the World Heritage designation.

2.2 More information on World Heritage sites

A second major concern expressed by participants was the limited access to publicly available information on assessment techniques and on World Heritage sites in general. Civil society should be empowered and engaged in the monitoring and interpretation of World Heritage sites, especially in light of new and emerging challenges and threats such as climate change, tourism impacts, pandemic restrictions, and geo-political situations.

2.3 More information on tools

Participants expressed a need for more practical assessment tools for both cultural and natural sites. Networking opportunities should be available for site managers to share information on assessment tools and institutional help should support them in understanding how to use assessment tools.

2.4 More technical support for World Heritage processes

Participants expressed a lack of technical support in preparing World Heritage nominations, understanding the *Operational Guidelines*, and adhering to monitoring requirements. This is especially the case for listing endangered natural sites.

2.5 Combining high-tech with low-tech

Participants discussed the need to combine advanced digital technologies with more traditional low-tech tools to improve the overall monitoring of World Heritage sites.

2.6 Ethical use of data

Another key discussion point during the debate was the ethical use of data and information technologies in the conservation and management of World Heritage sites.

2.7 More focus on capacity building in information technology

Parties involved in the nomination, assessment, monitoring, and interpretation of World Heritage sites have different capacity and skill levels. Capacity building in information technology should be focused where the need is greatest. To what extent can the private sector support capacity building and site management, especially in the areas of interpretation, recording, and documentation?

2.8 More tools to document intangible heritage

Participants expressed the need for better tools to capture and analyze intangible heritage. Because tools for documenting intangible heritage have not changed much over the past 30 years, there are many aspects which are not being captured.

2.9 The need for an information technology toolkit

During the debate, participants emphasized the need for an information technology toolkit to be developed and widely disseminated.

3. Ethics: towards an ethical framework of IT for heritage

It is widely acknowledged that the deployment of digital tools and the analyses of collected data are embedded with cultural, political, and economic contexts that are often mediated by institutions, private actors, government agencies, and community organizations. Discussions about the ethical use of digital technologies in heritage have gained increased attention over the past ten years, given the availability of low-cost sensors, the increasing pace of innovation, the quantity of

digital data being acquired, and the software platforms used by professionals, independent researchers, and academics.

In this context, participants in the IT debates discussed the challenges raised by ethical aspects of information technology. How can we ensure that digital tools will not only support decision-making strategies but also open up community debates? What role can heritage professionals play in ensuring that multiple voices and opinions will be captured, heard, and revealed, through a more equitable use of digital tools? How can scholars and practitioners prevent digital appropriation and reject the practice of data colonialism? How can we ensure the sustainability and transmission of digital records for posterity, in keeping with the World Heritage Convention goal of protecting heritage for the enjoyment of future generations?

The IT debates elicited a multiplicity of responses from participants, reflecting a range of perspectives. We have grouped the responses into five thematic areas, which could provide the foundation for an ethical framework for the use of Information Technology in heritage: inclusive data collection strategies and tools; data provenance and format; equitable access to data; use of recorded data; and inclusive narratives.

3.1 Inclusive data collection strategies and tools

A key topic in the debate was the use of inclusive data collection strategies and tools, including: making tools and action plans available in local languages; planning for community engagement in collecting data and creating data collection standards; promoting digital tools for community involvement in data collection and content creation; and ensuring the involvement of local stakeholders, visitors, and communities. Participants discussed the design of good strategies for adopting digital workflows to support effective data collection, data processing, and interpretation of World Heritage sites. To prevent digital appropriation and colonialism, data collection should be based on consensus and collaboration. Ownership and intellectual property should be agreed upon by the stakeholders. Indigenous communities, in particular, should be involved in the design and execution of responsible data collection strategies that respect community customs and traditions.

Participants also emphasized the importance of respecting the work of cultural heritage specialists working with information technologies, accepting differences of opinion, and fostering collegial behavior. In particular, participants spoke about

promoting solidarity, interdisciplinarity, the exchange of expertise, and the role of mentoring among professionals.

Finally, participants raised the importance of ensuring responsible use of monitoring tools such as sensors and drones, in circumstances where there is a risk of harm to local flora and fauna or cultural assets.

3.2 Data provenance and format

The debate raised the advantages of transparency in the workflows used in data collection, data processing, and interpretation, so that information might be shared about the quality of the data and the constraints faced in obtaining it. Participants discussed the importance of ensuring the protection of privacy for sensitive datasets by spatial aggregation methods, and of following established standards for collecting data at the appropriate scope, level, and methods of recording.

3.3 Equitable access to data

Participants were concerned with ensuring equitable access to data, including: democratizing access to heritage data, while considering the technical and ethical issues associated with this process; using open data software and file formats; promoting open databases and platforms; and having data that are transparent and customizable to the needs of specific heritage organizations.

3.4 Use of recorded data

There was considerable discussion around avoiding the misuse of data through appropriation, alteration, breach of intellectual property rights, and conflict of interest. Data should be stored in secure formats that respect privacy preferences and protect data integrity. Specialists working in World Heritage should exhibit professional behaviour, showing respect and impartiality, promoting integrity and accountability, and maintaining open and tolerant attitudes. The values and integrity of cultural heritage should be respected by showing respect for the local community and acknowledging their role in the protection and interpretation of World Heritage. Professionals should record data to ensure preparedness against the risk of future deterioration or damage. Collected information should be disseminated to the public to ensure transmission to future generations.

3.5 Inclusive narratives

Participants emphasized the need to encourage the presentation of multiple narratives, including conflicting narratives, by using information technologies that support storytelling through different media and voices. Having open-access,

digital spaces that allow the presentation of multiple narratives can be useful for reconciliation purposes. Care should be taken to strongly link these narratives to an understanding of the Outstanding Universal Value (OUV), attributes, and components of a World Heritage site.

3.6 Legal, regulatory, or traditional governance issues

A number of ethical issues also involve legal or regulatory issues. Participants expressed a strong desire to use open data sources and software to avoid copyright issues and licensing fees that might limit accessibility for certain World Heritage sites. They also discussed privacy issues raised by certain documentation techniques such as drones, which might invoke legal prohibitions in certain jurisdictions. Finally, participants were concerned about World Heritage sites that cross political boundaries; in terms of information technology, this might mean that one site would be grappling with multiple or conflicting laws in terms of copyright, privacy, open data, access, or protection.

4. Sustainability

Participants raised issues about sustainability at two levels: the sustainability of information technology systems as well as their application to more sustainable heritage conservation and presentation.

With regard to information systems, a key concern was the sustainability of data and the systems used to operate them, given the rapid changes in software, hardware, and storage systems. Other issues included the preservation of digital records for posterity, the sustainability of platforms for monitoring and interpreting sites, the usefulness of data portals beyond the lifetime of projects, energy consumption and other costs for ongoing maintenance, lack of local expertise, the challenge of updating data and systems, and the problem of technological waste. Participants from Africa reported specific problems with outdated systems and lack of local capacity.

Many participants believed that digital documentation could be a rapid and sustainable solution to monitoring, conserving, and presenting cultural and natural heritage sites. There are IT applications that improve knowledge in areas like species, forests, resource conditions, land erosion, and overcrowding. During Globinar 2.0, industry representatives explained the strengths and uses of various IT programs, some of which were featured in the projects submitted to the Global Competition, giving participants opportunities to better understand their applications.

The IT theme connects to Agenda 2030 in several ways. It is particularly relevant to SDGs 11 (Sustainable Cities and Communities), 12 (Responsible Consumption and Production), 13 (Climate Change) and 15 (Life on Land). The Transformational Impacts of Information Technology can provide and compare data on features and attributes at World Heritage sites. Such data can be useful to protect and safeguard heritage sites (11.4), support territorial planning and risk assessments (11.a,b), monitor visitor activities to improve sustainable tourism (12.b) and improve mitigation and adaptation strategies to address climate change (13.1, 13.3). Digital technology can also contribute to ecosystem management goals on land and in marine areas as set out in SDG 15.

5. Intersectoral collaboration

The organized debates triggered intersectoral collaboration and synergies at several levels. At a base level, the IT theme recruited a strong core team comprising organizers, anchors, moderators, technicians, and rapporteurs for each of the three online events. A competition team promoted, organized, recruited industry sponsors, mentored participants, and evaluated entries in the Global Competition. A policy team considered all the input and worked towards the final recommendations incorporated in this report.

The individuals involved in the core team came from different world locations and included emerging, mid-career, and established professionals. The team comprised representatives of government and intergovernmental organizations, industry, community members, academics, and students from both the nature and culture sectors. They worked together to plan, organize, and implement three international events across multiple time zones, run a global competition, and extract observations and conclusions that would lead to recommendations for action.

At a second level, the core team was able to work cohesively to attract even more representatives from all parts of the world, multiplying the diversity of voices contributing to the debate. This second tier included panellists and participants who joined discussions in the breakout rooms and on the Miro boards at each event, industry representatives who supported the Global Competition by sharing their expertise and products, and the multidisciplinary teams competing for prizes.

The competition itself attracted thirty-six teams who submitted creative and innovative proposals. The core team worked closely with industry participants to offer attractive prizes for the winning teams, including services, hardware, and software platforms. The two-phase selection process was conducted by an

independent evaluation team: nine finalists were selected from the thirty-six submissions. The core team appointed a mentoring team that worked closely with the finalist teams to improve their proposals. From the nine finalists, the evaluation team selected five winners: in first place (one team), second place (two teams), and third place (two teams).

Finally, the core team met with the winning teams and, in the process of discussing how best to provide the prizes contributed by the industry sponsors, identified new synergies for moving ahead, creating additional collaborations between industry, not-for-profit, and academia.

6. UNESCO priorities

The IT thematic debate touched on a number of UNESCO priorities, including the involvement of young people, regional disparities, and cultural diversity.

Young people around the world are enthusiastic and competent users of information technology and social media of all kinds. It is therefore not surprising that more than 50 percent of the core IT team were students and emerging professionals. Indeed, the global outreach team for IT is almost entirely composed of young people.

Many participants voiced concerns about regional disparities, particularly for access to basic infrastructure such as software and hardware, reliable internet connectivity, electricity, long-term data storage, and digitized data. African participants raised concerns about capacity building and sustained support for maintaining information systems for World Heritage sites over the long term.

UNESCO has long promoted inclusion and cultural diversity in its activities. In support of this priority, the IT team made social media posts in several languages. In an effort to attract a global audience for the Globinars, the team produced short promotional videos with messages in the following languages:

- Globinar 1.0: English, Akan, Korean, Mandarin, Spanish, Brazilian Portuguese, Hindi, French, Dutch, Arabic;
- Globinar 2.0: English, Italian, Brazilian Portuguese, Hindi, Korean, French, Arabic, Spanish, Akan, plus greetings in Amharic, Mandarin, Yoruba.

In addition, the promotional video for the Global Competition was available in eight languages, either spoken or subtitled: English, French, Arabic, Russian, Korean, Mandarin, Brazilian Portuguese, and Spanish.

The number of participants in the three consultation events reached 88 countries for Globinar 1.0, 61 countries for the February Webinar and 63 countries for Globinar 2.0. In addition, participants self-identified with different sectors including universities, industry, site management, and community organizations. A noteworthy example that demonstrates inclusion and diversity is the Global Competition: not only did the submitted projects address a reasonable balance between cultural (26) and natural (10) heritage sites, but the teams themselves came from all parts of the world (Figure 7). The case studies chosen by the teams also show global diversity (Figure 8).

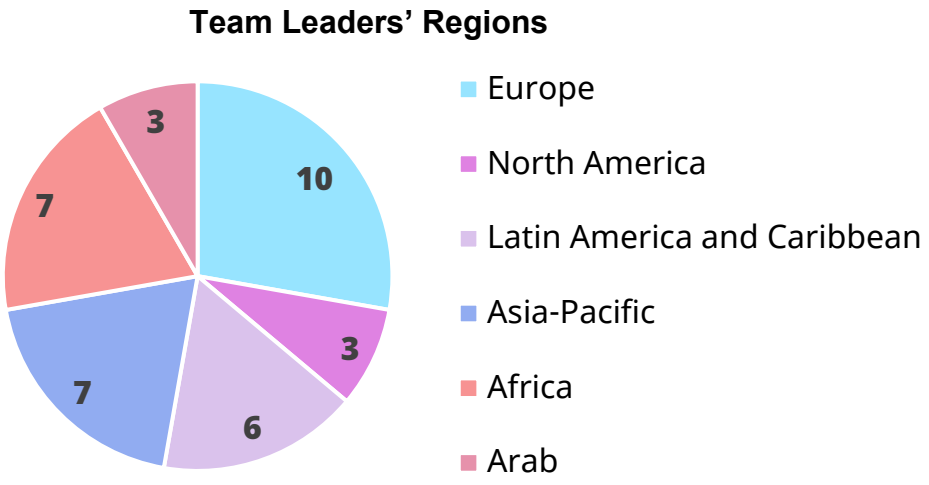

Figure 7: Team leaders of the thirty-six teams entered in the OWH IT Global Competition came from all six world regions. Source: OWH IT team, 2021

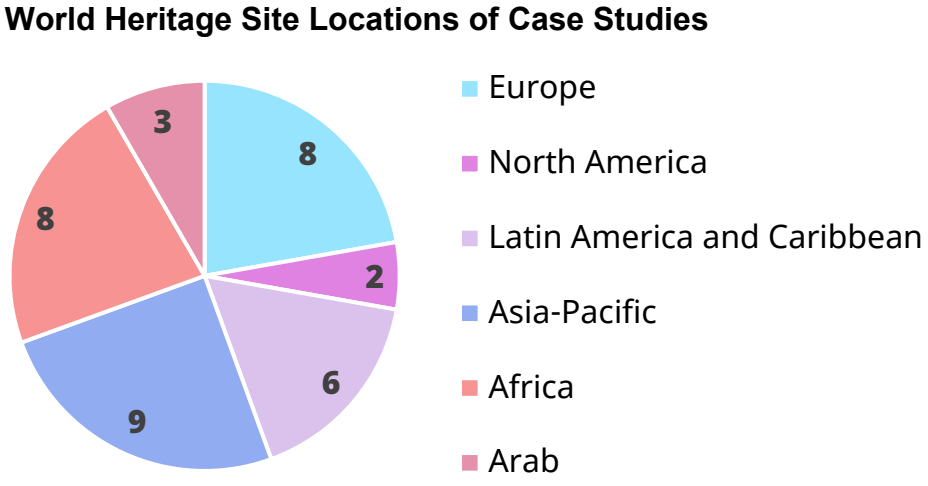

Figure 8: The thirty-six teams who entered the OWH IT Global Competition proposed IT solutions for World Heritage sites located in six different regions. Source: OWH IT team, 2021.

III. Contribution of the IT theme to the work of OWH

The #2021debate on the Transformational Impacts of Information Technology contributed to the OurWorldHeritage (OWH) goals by fostering a robust worldwide network, by exploring existing digital tools to protect, conserve and interpret World Heritage sites, and by identifying opportunities for enhanced digital capacity.

In its mission statement, OWH seeks to raise awareness about the challenges that the World Heritage system is currently facing in order to maintain its relevance for the next fifty years. A key goal for OWH is the engagement of communities and civil society in support of World Heritage. As the preceding sections of this report demonstrate, the IT theme reached a broad cross-section of heritage actors including site managers, practitioners, activist groups, academics, industry partners, civil society, and local communities. The main IT events of #2021debate—Globinars 1.0 and 2.0, the Webinar, and the Global Competition—mobilized an intergenerational network around the world.

The presentations, discussions in breakout-rooms, and team participation deepened an understanding of the many issues facing World Heritage sites and generated innovative ideas on how to move forward. The IT debates explored how big data and digital technologies could become tools to monitor and conserve World Heritage sites and to present multiple narratives in interpretation programs. Experts, teachers, non-governmental organizations, and private-sector colleagues came together to share their knowledge about opportunities to use digital technologies.

The IT team has identified three specific tools that would improve the conservation of World Heritage sites: an online catalogue of existing digital technologies, a Global Competition as a model for engaging communities and civil society, and an interactive online platform for monitoring World Heritage sites.

1. Online catalogue of existing digital technologies

Globinar 1.0 initiated a dialogue on the contribution of information technologies to the monitoring, conservation, presentation, and management of World Heritage sites. This 24-hour global event generated a collection of case studies from all regions of the world. There was general agreement that digital tools have a high potential to enhance heritage practice and research.

The Webinar on 6 February 2021 provided feedback on the policy discussions of Globinar 1.0. It explored ideas such as the characteristics of effective digital tools,

the requirements of data-sharing, sustainability of information systems, capacity-building, and intersectoral collaboration. Participants consistently observed that digital tools needed to be up-to-date, practical, and adaptable to the specific needs of sites with different typologies and scales. Data must be ethically sourced, disseminated, stored, and reused. Participants encouraged the adoption of the **FAIR** Guiding Principles for scientific data management and stewardship: **F**indability, **A**ccessibility, **I**nteroperability, and **R**euse of digital assets. They called for a transfer of knowledge through the dissemination of information on the application and accessibility of IT. Participants also discussed potential limitations to accessing and using digital tools in specific contexts and management frameworks.

Globinar 2.0 discussed a tentative proposal from the IT team to create an online catalogue that could harness existing digital tools to improve conservation, interpretation, and capacity building for World Heritage activities. Participants at the 24-hour event presented and debated a variety of digital tools and programs.

Following positive endorsement for this approach, the IT report proposes an online catalogue (Appendix F) of digital technologies used in conservation, monitoring, documentation, and interpretation. It is based on information collected during the OurWorldHeritage debates, and could be further refined in consultation with experts, partners, and stakeholders before being published online.

The catalogue is divided into three parts:

- **Part F.1**: The first section describes tools and methods that can be used to produce digital assets of World Heritage properties for the purpose of conservation, monitoring, presentation, and interpretation. Each description includes examples and URL links to resources.
- **Part F.2**: This section provides links to institutions that engage in capacity building and resource support for digital technologies.
- **Part F.3**: The matrix provides information on the applicability of tools, technologies, institutions, and resources for conservation/monitoring, interpretation/presentation, and capacity building across a variety of World Heritage properties. The categorization of the sites is based on the UNESCO Operational Guidelines 2019 Annex 3.

2. Global Competition as a model for engaging communities and civil society

Late in 2020, the IT team launched a Global Competition for projects that could serve as models for engaging communities and civil society. It was designed to celebrate innovative approaches to conserving and presenting heritage sites through the use of digital tools and information technologies, with a special focus on projects grounded in the needs and vision of local communities responsible for the stewardship of these places. The terms of the competition required competitors to connect with their site custodian as well as community members and partner organizations to envision a new way forward to monitor and interpret a World Heritage property. Also eligible were projects that demonstrated existing innovative uses of technology with the potential for replication at other World Heritage sites.

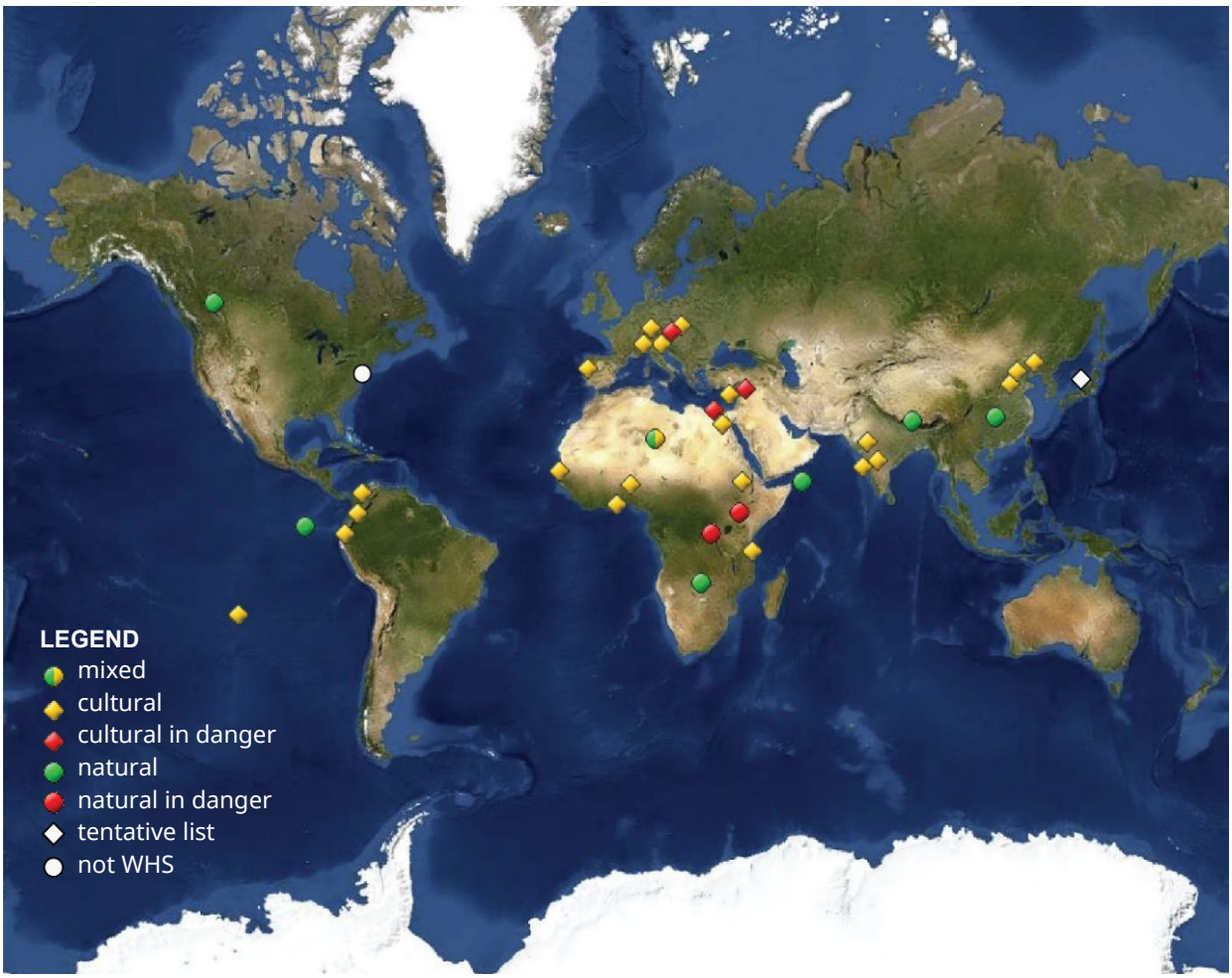

Figure 9: The project locations of the thirty-six teams who entered the OWH IT Global Competition. Source: OWH IT team, 2021; base map and symbols by UNESCO.

The Global Competition received thirty-six entries from all regions of the world (Figure 9). These competitors demonstrated how digital tools could be used in heritage conservation practice—in effect, a thoughtful series of innovative case studies. Based on a rubric that sought to balance the playing field between first-time and seasoned grant writers, nine finalists were selected at the February Webinar. This list was further reduced at Globinar 2.0 in April during which the five winning teams were announced (Appendix E).

From the perspective of capacity building, a key ingredient of the Global Competition was the mentoring process. Mentors and advisors from the team supported the nine short-listed finalists as they worked towards completing their submissions. The mentors and advisors provided advice and shared expertise from their experience in World Heritage and information technologies. The mentors focused on each finalist's development and resisted the urge to impose their own ideas. They were supportive and avoided judgmental discussions. The mentoring activities involved one-to-one meetings with each team, subsequent meetings with other experts related to the feedback provided in the initial coaching session, and final meetings for teams to present their revised proposals for feedback and suggestions.

The results of the competition show a wide geographic range with a balance between monitoring and storytelling, and a split between natural and cultural sites. The evaluation team took special care to structure the evaluation process to ensure that it would not bias the results in favour of one specific geographic region or one type of site. The results demonstrate that all types of projects had an equitable chance to compete. The transparent evaluation rubric and the diverse composition of the review committee, who came from different geographic regions and sectors of the field, were key aspects that ensured equitable chances within this competition.

The participation of industry partners was critical to the success of the Global Competition. Not only did they share their knowledge about the use of their IT tools during the formal events and mentoring sessions, they also generously donated prizes for the winning teams. Featuring a wide range of IT applications, the Global Competition enhanced an understanding of the potentially transformative power of information technologies, from geo-referencing site boundaries to using virtual reality to convey layered narratives at heritage places.

3. Interactive online platform for World Heritage sites

As part of the discussion on digital tools, the IT team discussed a long-term vision for an interactive online platform for monitoring World Heritage sites. Presented and discussed at Globinar 2.0, the concept envisages an e-platform that could provide access to many sources, including data, planning, monitoring and presentation tools, networking opportunities, and resources for continuing education and training. Participants raised issues such as funding and data storage, sustainability and long-term maintenance.

Such an ambitious undertaking would necessarily be a collaborative project with the involvement of ICOMOS, IUCN, ICCROM, and other interested parties. This collaborative global platform would draw on existing datasets and provide appropriate tools and real-time periodic analysis for monitoring, conserving, and interpreting heritage sites. It would also serve as a platform for capacity-building resources, examples of good practice, and mentoring programs. Ideally, the platform would integrate both cultural and natural sites of diverse scales and have a capacity to consider both tangible and intangible heritage.

By building a strong global network, by cataloguing existing digital tools to protect, conserve, and interpret World Heritage sites, and by identifying capacity-building opportunities, the IT theme contributes to the work of OWH.

IV. Next steps to advance the IT Theme and achieve improvements

This section contains a series of proposals on how to improve the protection, conservation, and management of World Heritage sites using digital technologies. Organized in three parts, it begins with initial steps for immediate implementation, followed by seven recommendations for action by diverse players, and finishes with specific ideas on how to update the *Operational Guidelines for the Implementation of the World Heritage Convention*.

1. What steps can be taken now?

OWH should post on its website the **online catalogue** of currently available digital resources prepared by the IT team (Appendix F) to support site protection, conservation and monitoring, and enhance interpretation of multi-layered narratives at World Heritage sites. The catalogue is a collection of digital resources with descriptions to help users select the best tools for their purpose. The catalogue is organized under four headings: conservation and monitoring,

interpretation and presentation, capacity building and networking, and data management and open data sources. To maintain its relevance, this catalogue should be updated periodically.

2. Recommendations

Information technologies affect all participants in the World Heritage system. The recommendations that follow are relevant to States Parties of the World Heritage Convention, their three Advisory Bodies (ICOMOS, IUCN, and ICCROM) and the UNESCO secretariat, as well as site managers, local authorities, civil society, communities, NGOs, educators, emerging professionals, industries, media, and interested individuals. Some recommendations can be implemented in the short term (see recommendations 2.1 to 2.4) while others are long-term proposals (see recommendations 2.5 to 2.7).

2.1 Digital tools

To overcome the digital divide, OWH should encourage the development of digital tools that are accessible, affordable, easy to operate, available in local languages, and adaptable to small/large cultural and natural sites. Digital tools should follow the FAIR principles: findable, accessible, inter-operative, and reusable.

2.2 Capacity-building programs

To improve digital literacy, OWH should support the development of capacity-building programs for diverse users, including local communities and site managers. Programs should be available in local languages and have on-going support services.

2.3 Guidance

OWH should encourage the development of guidance for information technologies and online tools to address issues like common data standards, digital archiving, data collection and management practices, regular updating, and security.

2.4 Code of ethics

OWH should adopt a specific code of ethics for the use of information technologies.

2.5 Networking platform

OWH should consider activities to sustain the robust intersectoral network of IT organizations, experts, partners, managers, and individuals developed during #2021debate. One possibility would be the creation of an online networking

platform to connect professionals, scholars, industry, communities, and site managers.

2.6 Exhibition

OWH should sponsor an exhibition of the results of the Global Competition on the Transformational Impacts of Information Technology during the 2022 World Heritage Committee session.

2.7 Interactive online platform

OWH should prepare terms of reference for a collaborative project with ICOMOS, IUCN, ICCROM, and other interested parties to host a publicly accessible and interactive online platform to serve all practitioners, including local communities and civil society. It should provide reliable and timely information about communities and civil society involvement as well as information on World Heritage sites. This collaborative global platform should draw on existing datasets and provide appropriate tools and real-time periodic analysis for monitoring, conserving, and interpreting heritage sites. It should also serve as a repository for capacity-building resources, examples of good practice, and mentoring programs. Ideally, the platform would integrate cultural and natural sites at diverse scales into a single platform and have the capacity to consider both tangible and intangible heritage.

3. Amendments to the World Heritage Operational Guidelines

The *Operational Guidelines for the Implementation of the World Heritage Convention* facilitates the work of the Convention. The World Heritage Committee periodically updates this document to reflect current decisions. During the debates on the Transformational Impacts of Information Technology, participants made suggestions for revisions to the *Operational Guidelines*. They considered that information and digital technologies could improve the nomination process, the monitoring of state of conservation reporting, site interpretation and presentation, and the engagement of communities and civil society. The *Operational Guidelines* could be enhanced to encourage States Parties to use information technologies for recording, archiving, conserving, and presenting the Outstanding Universal Value of World Heritage sites.

3.1 Nomination process

The *Operational Guidelines* should encourage the creation by the World Heritage Centre of a dynamic, cloud-based, online nomination tool, supported by principles, guidelines and protocols to integrate advanced recording techniques, information

technologies and other remote sensing tools into the nomination process. Examples of useful digital technologies include data mining, artificial intelligence, photogrammetry, 3D scanning, Lidar, Geographic Information Systems (GIS), Building Information Modeling (BIM), and satellite imaging. Using an online nomination tool would help establish verifiable information and data, such as geo-referenced boundaries and attributes of Outstanding Universal Value, as a basis for better identification, monitoring and management of World Heritage sites.

3.2 Monitoring

The *Operational Guidelines* should encourage States Parties and site managers to use digital technologies for site monitoring. Digital tools can provide real-time tracking using satellite imagery, drones, and earth observation technologies to support state of conservation reporting and distance monitoring. Information technologies can provide early detection of potential risks to the Outstanding Universal Value of World Heritage sites, such as deforestation, mining, illegal fishing, urban development, agricultural encroachment, flooding, and fire. Accurate and timely information can reveal important trends and facilitate appropriate risk mitigation actions.

3.3 Interpretation and presentation

The *Operational Guidelines* should encourage the creative use of information technologies to interpret and present World Heritage sites. Some approaches might include digital tools such as projection mapping, augmented reality (AR), mixed reality (MR), virtual reality (VR), digitally-assisted storytelling, and animation to support the dissemination of multiple narratives associated with the properties.

3.4 Community and civil society engagement

The *Operational Guidelines* should encourage the use of digital technologies to facilitate the participation and involvement of communities and civil society in conserving and managing World Heritage sites.

4. Conclusion

With these recommendations, the #2021debate on the Transformational Impacts of Information Technology concludes its report. The IT team deeply appreciates the involvement of so many enthusiastic participants, including site managers, heritage practitioners, activist groups, academics, emerging professionals, industry partners, civil society, and local communities. Collectively, they have made it possible to explore existing digital tools to protect, conserve, and interpret World

Heritage sites, and to identify opportunities for mobilizing information technology in the service of World Heritage.

V. More Information

Additional information is provided in the appendices to this report, as follows:

Appendix A: Members and Participants of the OWH IT Team

Appendix B: Programme for Globinar 1.0

Appendix C: Programme for the Moving Forward Webinar

Appendix D: Programme for Globinar 2.0

Appendix E: The OWH IT Global Competition

- Competitors of the Global Competition
- Evaluation Criteria Rubrics

Appendix F: Matrix and Catalogue of Digital Tools, Methods, and Resources for Heritage Conservations, Interpretation, and Capacity Building

- Appendix F Part F.1 Tools and Methods
- Appendix F Part F.2 Institutions and Resources
- Appendix F Part F.3 Information Technology Matrix for World Heritage: Digital Tools, Methods and Resources for Conservation, Interpretation, and Capacity Building

Appendix A: Members and Participants of the OWH IT Team

COMMITTEES:

[CT] Core Team
[EV] Evaluation
[IP] Identifying Participants
[IN] Industry
[PO] Policy
[SM] Social Media
[TM] Team Mentoring
[TK] Toolkit Team
[WB] Webinar
[BL] OWH Blog

COMMITTEE MEMBERS:

Christina Cameron (Canada)
OWH IT Coordinator
PO Co-Chair
[WB, BL]

Mario Santana Quintero (Canada)
OWH IT Co-Convener
TM Co-Chair
[CT, IP, IN, PO, WB]

Haifaa Abedalhaleem (Jordan)
OWH IT Co-Convener
TK Chair
[CT, IP, PO, TM, WB]

Michelle Duong (Canada)
Core Team Lead
[CT, IP, PO, SM, WB]

Joe Kallas (Lebanon)
SM Chair
Co-Chair of IN
[CT, SM, WB]

Rebecca Napolitano (USA)
EV Co-Chair
[CT, WB]

Hyeseung Shim (Rep. of Korea)
WB Anchor
[CT, IN, WB]

Laurie Smith (Canada)
PO Co-Chair
[WB]

Divay Gupta (India)
WB Co-Chair
[PO]

Kay Van Damme (Belgium)
WB Co-Chair
[TM]

Aziliz Vandesande (Belgium)
TM Co-Chair
WB Anchor

Doug Pritchard (Canada)
Co-Chair of IN
WB Anchor

Elizabeth Lee (USA)
Co-Chair of TM
WB Anchor

Elizabeth Silkes (USA)
IP Chair

Jonathan Bell (USA)
EV Co-Chair

Chen Yang (China)
WB Anchor

Naa Dedei Tagoe (Ghana)
WB Anchor
[CT, IP, WB]

Ludmila Albuquerque da Costa (Belgium/Brazil)
[CT, SM, WB]

Komal Potdar (India)
[CT, PO, TK]

Chunfeng Yang (China/USA)
[CT, WB]

Sarah Chicone (USA)
WB Anchor

Ona Vileikis (UK)
[CT, IP, PO, BL]

Verónica Heras (Ecuador)
[CT, IP]

Rashmi Gajare (USA)
[WB, PO, TK]

Daniele M. S. Paulino (Brazil)
[WB, PO, TK]

Isabelle Dillon-Sullivan (Canada)
[CT, SM, WB]

Mais Karaki (Canada)
[CT, SM, WB]

Carmelo Ignaccolo (USA/Italy)
[CT, PO, TK]

Sabrinna Cox (USA)
[SM, WB]

Thomas Rigauts (Cyprus/ Belgium)
[SM, WB]

Aidan Bethell (Canada)
[SM, WB]

Daniel Walber (USA)
[WB]

David Bitterman (USA)
[EV]

Nazih Fino (USA)
[TK]

Bijan Rouhani (UK)
[TM]

Alice Paladini (Belgium/Italy)
[WB]

Kevin Hsu (Singapore)
[WB]

William A. Agangiba (Ghana)
[WB]

Méryas Kouton (Bénin)
[EV]

Gaetano Palumbo (Italy)
[EV]

Margaret Breuker (USA)
[EV]

Rusudan Mirzikashvili (Georgia)
[EV]

Michael Schuller (USA)
[IP, TM]

Monalisa Maharjan (Nepal/Portugal)
[IP, BL]

Yiannis Avramides (USA)
[TM]

Stephen Fai (Canada)
[TM]

Eduardo Escalante Carrillo (Mexico)
[BL]

Brett Leavy (Australia)
[TM]

Dmitriy Voyakin (Kazakhstan / Uzbekistan)
[IP]

AFFILIATED INSTITUTES:

Beijing University of Civil Engineering and Architecture
Built Heritage
Carleton Immersive Media Studio (CIMS)
Carleton University
CyArk
Emerald Publishing
Faraja Africa Foundation
Ghent University
Heritage Architecture
ILUCIDARE
Indian National Trust for Art and Cultural Heritage (INTACH)
International Institute for Central Asian Studies (IICAS)
Johns Hopkins University, Cultural Heritage Management
Journal of Cultural Heritage Management and Sustainable Development
KAIST Graduate School of Culture Technology
KU Leuven, Raymond Lemaire International Centre for Conservation (RLICC)
Learning Times
Penn State
Preparatory Office for International Centre for the Interpretation and Presentation of World Heritage Sites under the auspices of UNESCO
Tongji University
University of Mines and Technology (UMaT)

ALL EVENT PARTICIPANTS:

Globinar, Moving Forward, and Globinar 2.0 Participants (including all anchors, speakers, panellists, moderators, presenters, rapporteurs, technical support)

Aalya Rekhi (India)
Abdullah Alqaisi (Jordan)
Abdulrahman Al Eryani (Yemen/Finland)
Abha Narain Lambah (India)
Aidan Bethell (Canada)
Aiona Santana (Canada)
Alcilia Afonso de Albuquerque e Melo (Brazil)
Alejandra Albuerne (UK)
Ali Haloob (Iraq)
Alice Biada (Cameroon)
Alice Paladini (Belgium)
Aline Dias Assoni (Brazil)
Alzbeta Rejentova (Czech Republic)
Amilcar Vargas (Mexico/Spain)
Ana Paula Ribeiro de Araújo (Brazil)
Athanasios Moysiadis (Greece)
Andi Zhuang (China)
Andrea Bartoli (Spain)
Andrea Giorgalli (Cyprus)
Andrés Gaviria Valenzuela (Colombia)
Andrew Feinberg (USA)
Anqi Cheng (China)
Anupama Mallik (India)
Aristotelis Antoniou (Greece)
Arun Menon (India)
Augustin Basabose (Democratic Rep. of Congo)
Aziliz Vandesande (Belgium)
Benedetto Allotta (Italy)
Bernadette Devilat (UK)
Bijan Rouhani (UK)
Boris Erg (Serbia)
Borna Rahmnay Farnood (USA)
Carlos López (Ecuador)
Carmelo Ignaccolo (USA/Italy)
Catherine Lavoie (USA)
Chen Yang (China)
Chloé Campo - de Montauzon (France)
Chloe Pei (China)
Chris Wiebe (Canada)
Christina Cameron (Canada)
Christoph Held (Germany)
Chunfeng Yang (USA/China)
Claudia Cancino (USA)
Claudia Ortiz (Ecuador)
Cyril Kormos (USA)
Daniel Blersch
Daniel Walber (USA)

Daniele Melo Santos Paulino (USA/Brazil)
Deepti Sharma (India)
Divay Gupta (India)
Dominique Pouliquen (USA/France)
Doo-Won Cho (Rep. of Korea)
Douglas C. Comer (USA)
Douglas Pritchard (Canada)
Efstathios Adamopolous (Italy/Greece)
Elisabetta Airaghi (Belgium)
Elizabeth Lee (USA)
Elizabeth Silkes (USA)
Eloisa Dezen-Kempter (Brazil)
Elyse Hamp (Canada)
Emily L. Spratt (USA)
Emmanuel Wabwire (Uganda)
Ester van Steekelenburg (Hong Kong)
Eugene Ch'ng (China)
Eugene Jo (Rep. of Korea)
Evan Fakhoury (Lebanon)
Fabio Attorre (Italy)
Fatmagul Oge (Cyprus)
Felix Dunya (Kenya)
Fernando Montejo (Colombia)
Filiberto Chiabrando (Italy)
Fkereselase Sifir (Ethiopia)
Francesco Bandarin (Italy)
Freed Gomes (Canada)
Fulong Chen (China)
Gamini Wijesuriya (Sri Lanka)
Gayathri Hegde (India)
Georgios Toubekis (Germany)
Giorgia Cesaro (Jordan)
Haifaa Abedalhaleem (Jordan)
Henry Wellington (Ghana)
Herminia Din (USA)
Hilary Grant (Canada)
Hilary Romaniuk (Canada)
Himanshu Ghosh (India)
Hong Yang (China)
Hyeseung Shim (Rep. of Korea)
Ibrahim Tchan Issifou (Bénin)
In-Souk Cho (Rep. of Korea)
Isabelle Dillon-Sullivan (Canada)
Jana Budosova (Slovakia)
Javier Ortega (Portugal)
Jean-François Caron (France)
Ji Young Jun (Rep. of Korea)
Jimena Quijano (Colombia/Belgium)
Jing Li (China)
Joaquín Garcia (Spain)
Joe J. Kallas (Lebanon)
Joey Doherty (Canada)
Jonathan Bell (USA)
José Bastante (Peru)
Julie Ivanoff (Canada)
Julio Cesar Perez Hernandez (Cuba)
Kaanan Thakkar (India)
Kaneez Zehra Hassan (USA)
Katie Graham (Canada)
Kay Van Damme (Belgium)
Kevin Hsu (Singapore)
Khalifa Al Khalifa (Bahrain)
Kitty Man (Canada)
Komal Potdar (India)
Kyong-O Moon (Rep. of Korea)
Kyung-Sik Woo (Rep. of Korea)
Laurie Smith (Canada)
Luca Malatesta (Italy)
Ludmila Albuquerque da Costa (Beligum/Brazil)
Luigi Barazzetti (Italy)
Mais Karaki (Canada)
Mamata Rao (India)
Mara Cruz Michea (Chile)
Marco Antônio Penido de Rezende (Brazil)
Marco Funari (Portugal)
Maria Gravari-Barbas (France)
Mariana Correia (Portugal)
Mario Santana Quintero (Canada)
Martha Gift Ainembabazi (Uganda)
Marwa Wahib Adwan (Palestine)
Mary McPartland (USA)
Masahito Yoshida (Japan)
Maurice Murphy (Ireland)
Maurizio Forte (USA)
Maya Ishizawa (Japan/Germany)
Mc Phillip Rosary Mwithokona (Malawi)
Mechtild Rössler (France)
Mensah Sitti (Ghana)
Merli V. Guerra (USA)
Méryas Kouton (Bénin)
Miaole Hou (China)
Michael Oh (Rep. of Korea)
Michael Schuller (USA)
Michel Cotte (France)
Michelle Duong (Canada)
Milena Ivkovic (Netherlands)
Miquel Reina Ortiz (Canada)
Mitali Vij (India)
Mohamed Talaat El-Hennawy (Egypt)
Monalisa Maharjan (Nepal/Portugal)
Mounir Bouchenaki (Algeria/France)
Muhammad Rakeh Saleem (USA)
Munyaradzi Elton Sagiya (Zimbabwe)
Naa Dedei Tagoe (Ghana)
Nada Hosking (USA/Morocco)
Nan Bai (Netherlands)
Nathalie Peutz (USA)
Nazih Fino (USA)
Neel Kamal Chapagain (Nepa)
Nicolás Arellano (Canada)
Nizar Al Adarbeh (Jordan)
Nupur Prothi Khanna (India)
Oriana Santana (Canada)

Pankaj Manchanda (India)
Pascall P. Taruvinga (South Africa)
Patricia Alberth (Germany)
Patricia O'Donnell (USA)
Paul Rogers (Australia)
Peace Sasha Musonge (Uganda)
Petr Vahalík (Czech Republic)
Prashant Mukherjee (India)
Rachel Fernandez (USA)
Ragini Vishwas Karmarkar (Belgium/India)
Rashmi Gajare (USA)
Ratish Nanda (India)
Rebecca Napolitano (USA)
Renée Hallé (Canada)
Riin Alatalu (Estonia)
Roberto Di Giulio (Italy)
Rohit Jigyasu (India)
Rosie Mercer (Zambia)
Rummanuddin Siddiqi (India)
Sabrinna Cox (USA)
Salah Amokrane (Algeria)
Saleh Al Noaimat (Jordan)
Sameeha Sheth (India)
Sangmook Park (Rep. of Korea)
Sarah Chicone (USA)
Sarah Kenderdine (Switzerland)
Sarath Chandra (India)
Scott Purdy (USA)
Shadreck Chirikure (UK/South Africa)
Shikha Jain (India)
Shizhen Xiao (China)
Siro Kim (Rep. of Korea)
Souayibou Varissou (Bénin)
Stacy Vallis (New Zealand)
Stefania Petralla (Italy)
Stephanie Wynne-Jones (UK)
Stephen Battle (UK/Switzerland)
Stephen Fai (Canada)
Subrata Nath (India)
Sun Park (UK/Rep. of Korea)
Susan Fayad (Australia)
Takeyuki Okubo (Japan)
Tariq Al Murri (Egypt)
Tennessee Mills (USA)
Teresa Cunha Ferreira
Teresa Patricio (Belgium)
Thomas Rigauts (Belgium/Cyprus)
Tim Badman (UK)
Verónica Heras (Ecuador)
Vinod Daniel (Australia/India)
Wei Dong (China)
William Akotam Agangiba (Ghana)
Wu-Wei Chen (China)
Xiaotong Guo (China)
Yang Ruixia (China)
Yiannis Avramides (USA)
Yichuan Shi (UK/China)
Yingchun Li (China)
Youssouph Diedhiou (Senegal)
Yu Zheng (Canada)
Zaki Aslan (UAE)
Zhe Li (China)
Zine-Eddine Seffadj (Algeria)

INDUSTRY & SPONSOR PARTICIPANTS:

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Preparatory Office for International Centre for the Interpretation and Presentation of World Heritage Sites under the auspices of UNESCO

Preparatory Office for International Centre for the Interpretation and Presentation of World Heritage Sites under the auspices of UNESCO

TimeLooper

World Sensing

Zoller+Frölich

Appendix B: Programme for Globinar 1.0

Session 1

OUR WORLD HERITAGE

Updated: January 8, 2021

TRANSFORMATIONAL IMPACTS OF INFORMATION TECHNOLOGY

GLOBINAR

PROGRAMME

Saturday, January 9, 2021

SESSION 1: Bridging the Digital Gap in Our World Heritage - Austral-Asia

12:00 PM start in GMT+8 time zone (e.g. Beijing, Manila, Perth)

Anchors: Divay Gupta, Hyeseung Shim, Chen Yang

hour	Session		Time	Topics & Activities	Moderators	Speakers/Panelists	Rapporteurs	Technical Support
1	Session 1	Plenary	12:00 - 12:07	Introduction Icebreaker & Poll Theme video - Transformational Impacts of Information Technology	Mario Santana Hyeseung Shim			Chunfeng Yang Ji Young Jun
			12:07 - 12:10	Global Competition Announcement	Hyeseung Shim			
			12:10 - 12:40	Main theme: Bridging the Digital Gap in Our World Heritage (with the 3 thematic speakers) Sub-theme: Monitoring (10 min.)	Chen Yang	Wei Dong	Komal Potdar Kaneez Zehra Hassan (Q)	
				Sub-theme: Nature - culture linkage (10 min.)		Yoshida Masahito		
				Sub-theme: Interpretation (10 min.)		Susan Fayad		
			12:40 - 13:00	Recap on the 3 themes : Identification of challenges, priorities and best practices	Divay Gupta			
2	Session 1		5-min break (13: 05-13:10)	Introduction to Panel Discussions and Breakout Rooms Poll - Participants fill out short and fun poll	Hyeseung Shim			
		Panel Discussions	13:10 - 13:50	Breakout rooms for panel discussions in parallel Panel 1: Monitoring & Visual Damage Assessment (English)	Stacy Vallis Haifaa Abedalhaleem	Arun Menon Doo-Won Cho Miaole Hou Ratish Nanda Takeyuki Okubo Zhe Li	Komal Potdar Mitali Vij	Ji Young Jun
				Panel 2: Transcending Natural & Cultural Heritage - Learning from Each Other (English)	Kay Van Damme Shikha Jain	Kyong-O Moon Kyung-Sik Woo Nupur Prothi Khanna Shizhen Xiao	Aalya Rekhi	Xiaotong Guo
				Panel 3: Interpretation & Communication - Multiple Narratives (English)	Yingchun Li Anupama Mallik	Abha Narain Lambah Chloe Pei Eugene Ch'ng Mamata Rao Subrata Nath Vinod Daniel	Gayathri Hegde Rumman Siddique	Andi Zhuang
				Panel 4: Special Session - Digital Initiative for Intangible Heritage (English + Mandarin)	Neel Kamal Chapagain Wu-Wei Chen	Athanasios Moysiadis Hong Yang Monalisa Maharjan Sangmook Park	Deepti Sharma	Yu Zheng
			13: 50 - 14:00	10-minute break; participants return to main room A break-out room for anchors, moderators, and rapporteurs				
3	Session 1	(Re)plenary	14:00 - 14:20	Recap the discussion - presentation of main discussion points from each breakout room	Divay Gupta	Moderators of each Panel Discussion		
			14:20 - 14:50	Open interactive discussion with Q&A (poll) from participants & online chats	Chen Yang		Komal Potdar Aalya Rekhi (Q)	Chunfeng Yang Ji Young Jun
			14:50 - 14:55	Announcements on the next session, competition, poll	Hyeseung Shim			
			14:55 - 15:00	Closing Remarks	Haifaa Abedalhaleem			
4	Session 1	Interactive discussion	15:00 - 16:00	Videos + Discussion Presentation of video from each sub theme Networking	Divay Gupta Hyeseung Shim Chen Yang	Athanasios Moysiadis Eugene Ch'ng HIST Himanshu Ghosh Shikha Jain Subrata Nath Zhe Li	Gayathri Hegde Mitali Vij (Q)	Chunfeng Yang Ji Young Jun
5	Session 1 BREAK	Networking Break	16:00 - 18:00	Brainstorming - Informal Networking and Socializing: Miro, Zoom, PollEverywhere Break-out room 1: Expert talks (20-min) (Mitali Vij) Break-out room 2: Follow-up questions (Aalya Rekhi)	Gayathri Hegde Deepti Sharma	Prashant Mukherjee Pankaj Manchanda Anupama Mallik CHA of Korea Shikha Jain, Kailash Rao Siro Kim Takeyuki Okubo Miaole Hou (Other videos in Miro)	Kaneez Zehra Hassan Rumman Siddique (Q)	Chunfeng Yang Ji Young Jun

To find out when Session 1 starts for your time zone, please see our website:
https://www.ourworldheritage.org/it_globinar/

GO TO BIOS

Sessions 2A/2B

OUR WORLD HERITAGE

Updated: January 9, 2021

TRANSFORMATIONAL IMPACTS OF INFORMATION TECHNOLOGY
GLOBINAR
PROGRAMME

Saturday, January 9, 2021

SESSION 2: Technology Across Borders of Our World Heritage - Arab Region, Africa & Europe

12:00 PM start in GMT+2 time zone (e.g. Amman, Beirut, Cape Town, Helsinki)

Anchors: Kay Van Damme, Aziliz Vandesande, Haifaa Abedalhaleem, Naa Dedei Tagoe

hour	Session		Time	Topics & Activities		Moderators	Speakers/Panelists	Rapporteurs	Technical Support
7	Session 2A	Plenary	12:00 - 12:07	Introduction Icebreaker & Poll Global Competition Announcement		Kay Van Damme Aziliz Vandesande			William Akotam Agangiba + Mensah Sitti
			12:07 - 12:10	Recap from Session 1: Bridging the Digital Gap - Australasia Pacific			Divay Gupta		
			12:10 - 12:30	Thematic Discussion: Technology Across Borders of Our World Heritage			Teresa Patricio Mounir Bouchenaki Tim Badman Stephen Battle	Alice Paladini	
			12:30 - 12:40	Recap of Thematic Discussion Thematic Videos Poll - Participants fill out short and fun poll					
			12:40 - 12:50	Introduction to Panel Discussions and Breakout Rooms					
	Session 2A	Panel Discussions	12:50 - 13:00	Introduction and 'ground rules' on how to participate Poll - Participants fill out short and fun poll					
8			13:00 - 13:40	Breakout rooms for panel discussions in parallel	Panel 1: Digitization and Documentation (English)	Luigi Barazzetti Naa Dedei Tagoe	Luca Malatesta Amilcar Vargas Sarah Kenderdine	Carmelo Ignaccolo	Felix Dunya Joey Doherty
					Panel 2: Monitoring (English)	Aziliz Vandesande Fabio Attorre	Petr Vahalik Benedetto Allotta Filiberto Chiabrando	Sun Park	Mensah Sitti
					Panel 3: Transcending Culture & Nature (English)	Kay Van Damme Fkereselase Sifir	Peace Sasha Musonge Haifaa Abedalhaleem Teresa Cunha Ferreira	Jimena Quijano	Maureen Odhiambo Julie Ivanoff
					Panel 4: Multiple Narratives: Interpretation & Communication (French)	Jean-François Caron Chloé Campo de Montauzon	Teresa Patricio Michel Cotte Alice Biada	Thomas Rigauts	Joe Kallas
		(Re)plenary	13:40 - 13:55	Recap: brief summary from each Panel Discussion				Rapporteurs	
			13: 55 - 14:00	Closing Remarks & Welcome to Session 2B		Aziliz Vandesande Kay Van Damme	Haifaa Abedalhaleem Naa Dedei Tagoe		
9	Session 2B	Plenary	14:00 - 14:07	Introduction Icebreaker & Poll Global Competition Announcement		Haifaa Abedalhaleem Naa Dedei Tagoe			William Akotam Agangiba Mensah Sitti
			14:07 - 14:10	Recap from Session 1: Bridging the Digital Gap - Australasia Pacific & Session 2A			Kay Van Damme Aziliz Vandesande		
			14:10 - 14:40	Main theme: Technology Across Borders of Our World Heritage (with the 3 thematic speakers)	Technology Facilitating the Decision-making Process: Tackling the Monitoring and Conservation Challenges		Abdulrahman Al Eryani	Carmelo Ignaccolo	
					Transboundary Collaboration: New Approaches & Technologies to Transboundary Conservation		Boris Erg		
					Interpretation and Cultural-Natural Linkages		Souayibou Varissou		
			14:40 - 14:50	Recap: Identification of challenges, priorities, and best practices					
			14:50 - 15:00	Short break and transition to breakout rooms					
10	Session 2B	Panel Discussions	15:00 - 15:10	Introduction and 'ground rules' on how to participate Poll - Participants fill out short and fun poll					
			15:10 - 15:50	Breakout rooms for panel discussions in parallel	Panel 1: Monitoring (English)	Aziliz Vandesande	Munyaradzi Elton Sagiya Rohit Jigyasu Abdessatar Belkhouja Méryas Kouton Marwa Adwan	Peace Sasha Musonge	Felix Dunya
					Panel 2: Digitization / Archiving (English)	Naa Dedei Tagoe	Bijan Rouhani Ali Haloob Yichuan Shi Nizar Al Adarbeh	Carmelo Ignaccolo	Mensah Sitti
					Panel 3: Interpretation & Intangible Heritage (English)	Sun Park Nathalie Peutz	Abdulrahman Al Eryani Pascall P. Taruvinga Emmanuel Wabwire Henry Wellington Shadreck Chirikure	Julie Ivanoff	Maureen Odhiambo

Sessions 2A/2B continued

				Panel 4: Nature-Culture Linkages (English)	Kay Van Damme	Maya Ishizawa Salah Amokrane Saleh Al Noaimat Susan Keitumetse	Alice Paladini	Joe Kallas
				Panel 5: Cross-boundary Collaborations (English)	Mohamed El-Hennawy	Khalifa Al Khalifa Boris Erg Mc Phillip Rosary Mwithokona Souayibou Varissou	Rebecca Napolitano	Joey Doherty
		15:50 - 16:00	10-minute break; return to main room					
11	Session 2B	(Re)plenary	16:00 - 16:20	Recap: brief summary from each Panel Discussion (4 min. each)	Haifaa Abedalhaleem Naa Dedei Tagoe	Rapporteurs		William Akotam Agangiba Joe Kallas
			16:20 - 16:50	Open interactive discussion with Q&A from participants & online chats			Julie Ivanoff	
			16:50 - 17:00	Closing Remarks (end session 2)	Haifaa Abedalhaleem Naa Dedei Tagoe Kay Van Damme			
12	Session 2B	Interactive discussion	17:00 - 17:30	Informal Networking and Socializing	Haifaa Abedalhaleem			William Akotam Agangiba
			17:30 - 18:00	Videos + Discussion Presentation of video from each sub theme Networking	Kay Van Damme			
13	Session 2 BREAK	Networking Break	18:00 - 20:00	Informal Networking and Socializing: Miro, Zoom, PollEverywhere	Rapporteurs / EPs			Nicolás Arellano Risopatron

To find out when Session 2 starts for your time zone, please see our website:

GO TO BIOS

Session 3

OUR WORLD HERITAGE

Updated: January 9, 2021

TRANSFORMATIONAL IMPACTS OF INFORMATION TECHNOLOGY
GLOBINAR
PROGRAMME

Saturday, January 9, 2021

SESSION 3: A Digitally Interconnected Our World Heritage - Americas

12:00 PM start in GMT-6 time zone (e.g. Chicago, Mexico City, Winnipeg)

Anchors: Christina Cameron, Mario Santana Quintero, Michelle Duong

hour	Session		Time	Topics & Activities	Moderators	Speakers/Panelists	Rapporteurs	Technical Support
15	Session 3	Plenary	12:00 - 12:10	Welcome to Session Introduction Theme video - Transformational Impacts of Information Technology	Chris Wiebe			Elyse Hamp
			12:10 - 12:15	Global Competition Announcement	Mario Santana			
			12:15 - 12:20	Recap from Sessions 1 and 2	Haifaa Abedalhaleem			
			12:20 - 12:50	Main theme: A Digitally Interconnected Our World Heritage (with the 6 speakers @ 5 min. each)	Christina Cameron Mario Santana		Laurie Smith	
				The State of Conservation of World Heritage Sites		Christina Cameron		
				The Presentation of Multiple Narratives through Tools of Interpretation		Elizabeth Silkes		
				Transcending Nature & Culture Connections of World Heritage		Cyril Kormos		
				Digital Technologies: Recording and Presentation		Douglas Pritchard		
				Digital Technologies: Remote Sensing		Douglas Comer		
				Challenges and Opportunities during COVID-19		Mario Santana		
			12:50 - 13:00	Introduction to Panel Discussions and Breakout Rooms Poll - Participants fill out short and fun poll	Michelle Duong			
16	Session 3	Panel Discussions	13:00 - 13:50	Breakout rooms for panel discussions in parallel				
				Panel 1: Storytelling (English)	Elizabeth Lee	Chris Wiebe Christina Cameron Herminia Din Maurizio Forte Sarah Chicone Stephen Fai	Elizabeth Silkes	Tennessee Mills Mais Karaki
				Panel 2: Monitoring (English)	Michael Schuller	Douglas Comer Douglas Pritchard Emily L. Spratt Rashmi Gajare Yiannis Avramides	Rebecca Napolitano	Isabelle Dillon-Sullivan Renée Hallé
				Panel 3: Multiple Narratives, Monitoring, Transcending Nature & Culture (Spanish)	Alejandra Albuerne	Jose Bastante Claudia Cancino Verónica Heras Julio Perez Hernandez Andres Gaviria Valenzuela Mario Santana Quintero Alfredo Santana Carlos López	Bernadette Devilat Miquel Reina Ortiz	Nicolás Arellano Risopatron Oriana Santana
				Panel 4: Multiple Narratives, Monitoring, Transcending Nature & Culture (Portuguese)	Marco Antônio Penido de Rezende	Alcilia Afonso de Albuquerque e Melo Eloísa Dezen-Kempter Ana Paula Ribeiro de Araújo Daniele Melo Santos Paulino	Ludmila Albuquerque da Costa	Aline Assoni Freed Gomes
			13: 50 - 14:00	10-minute break; participants return to main room				
17	Session 3	(Re)plenary	14:00 - 14:05	Welcome back to Plenary	Mario Santana			Elyse Hamp Michelle Duong
			14:05 - 14:25	Recap: 5-minute summary from each Panel Discussion		Elizabeth Silkes Rebecca Napolitano Bernadette Devilat Ludmila Albuquerque da Costa		
			14:25 - 14:50	Open interactive discussion with Q&A from participants & online chats	Laurie Smith		Rebecca Napolitano	
			14:50 - 15:00	Closing Remarks	Christina Cameron			
18	Session 3	Interactive discussion	15:00 - 16:00	Videos + Discussion Presentation of video from each sub theme Networking	Michelle Duong			Freed Gomes Daniele Melo Santos Paulino
19	Session 3 BREAK	Networking Break	16:00 - 19:00	Informal Networking and Socializing: Miro, Zoom, PollEverywhere	Rapporteurs / EPs			Michelle Duong

To find out when Session 3 starts for your time zone, please see our website:
https://www.ourworldheritage.org/it_globinar/

GO TO BIOS

Session Next Steps

Updated: January 6, 2021

OUR WORLD HERITAGE

TRANSFORMATIONAL IMPACTS OF INFORMATION TECHNOLOGY
GLOBINAR
PROGRAMME

Saturday, January 9, 2021

THE NEXT STEP: EMERGING PROFESSIONALS TAKING THE LEAD

5:00 PM start in GMT-8 time zone (e.g. Los Angeles, Vancouver)

Anchors: Elizabeth Lee, Nada Hosking

hour	Session		Time	Topics & Activities	Moderators	Speakers/Panelists	Rapporteurs	Technical Support
23	The Next Step	Plenary	17:05 - 17:10	Welcome to The Next Step	Elizabeth Lee			
			17:10 - 17:15	Global Competition Reminder	Mario Santana			
			17:15 - 17:20	Session 1 Takeaways		Hyeseung Shim		
			17:20 - 17:25	Session 2 Takeaways	Elizabeth Lee	Naa Dedei Tagoe		
			17:25 - 17:30	Session 3 Takeaways		Michelle Duong		
			17:30 - 17:50	Emerging Professionals Commentary about the Globinar	Nada Hosking	Chen Yang Chunfeng Yang Stacy Vallis Alice Paladini Carmelo Ignaccolo Peace Sasha Musonge Aline Assoni Ludmila Albuquerque da Costa Miquel Reina Ortiz Rebecca Napolitano Mitali Vij	Freed Gomes	Renée Hallé
			17:50 - 17:55	Global Polling Results	Elyse Hamp			
			17:55 - 18:00	Closing Remarks	Haifaa Abedalhaleem Christina Cameron Mario Santana			

To find out when The Next Step starts for your time zone, please see our website:
https://www.ourworldheritage.org/it_globinar/

GO TO BIOS

Appendix C: Programme for Moving Forward Webinar

Sessions 1 & 2

OUR WORLD HERITAGE

Thank you to all who joined us! We will inform you when the recording is ready.

UPDATED: FEBRUARY 1, 2021

REGISTRATION CLOSED

visit our webpage

TRANSFORMATIONAL IMPACTS OF INFORMATION TECHNOLOGY MOVING FORWARD PROGRAMME

Saturday, February 6, 2021

Moving Forward: Innovative Tools & Untold Stories in OurWorldHeritage

SESSION 1: 9 AM Dubai (GMT+4) / 2 PM Seoul (GMT+9)
SESSION 2: 9 AM Ottawa (GMT-5) / 2 PM London (GMT)

Anchors: Douglas Pritchard & Elizabeth Lee

(1) = session 1 only
(2) = session 2 only

Itinerary	Time	Topics & Activities	Moderators	Speakers	Rapporteurs	Technical Support
Introduction (10 min)	0h00m - 0h10m	Welcome Opening Remarks	Douglas Pritchard Elizabeth Lee	Mario Santana (1) Christina Cameron (2)	Komal Potdar (1) Stefania Petralla (1) Sun Park (2) Rashmi Gajare (2)	Michelle Duong Chunfeng Yang Ji Young Jun (1) Elyse Hamp (2)
		Global Competition		Hyeseung Shim (1) Verónica Heras (2)		
		Introduce Miro Board + Polling		Michelle Duong Hyeseung Shim		
Policy Discussion (30 min)	0h10m - 0h40m	Key Policy Themes from the Globinar	Mario Santana, Divay Gupta, & Haifaa Abedalhaleem (1) Christina Cameron, Laurie Smith, & Haifaa Abedalhaleem (2)			
		Q & A Session / Interactive Miro Discussion				
Industry Showcase (50 min)	0h40m - 1h30m	Announcement of Prizes	Douglas Pritchard Joe Kallas	Zoller & Fröhlich CapturingReality WorldSensing Cintoo Timelooper		
		Industry Showcase				
Shortlist Announcement (20 min)	1h30m - 1h50m	Global Competition Evaluation	Douglas Pritchard Elizabeth Lee	Jonathan Bell (1) Rebecca Napolitano (2)		
		Announcement of Shortlisted Proposals				
		Presentation of Mentoring Ateliers		Mario Santana		
Next Steps (10 min)	1h50m - 2h00	What's next for IT Introducing Tourism		IT Team Tourism Team		

Appendix D: Programme for Globinar 2.0

Session 1

OUR WORLD HERITAGE

Updated: 4/9/2021

REGISTRATION CLOSED

https://www.ourworldheritage.org/it_events/

TRANSFORMATIONAL IMPACTS OF INFORMATION TECHNOLOGY

GLOBINAR

PROGRAMME

Saturday, April 10, 2021

SESSION 1

12:00 PM start in UTC +8 (Shanghai / Perth / Singapore)

Anchors: Chen Yang, Divay Gupta, Hyeseung Shim

hour	Session		Time		Topics & Activities	Moderators	Speakers/Panelists	Rapporteurs	Technical Support
1	1	Plenary	0m - 10m	**Introduction**	Opening Remarks Icebreaker & Poll Introduce Keynotes	Divay Gupta	Mario Santana Quintero Hyeseung Shim	Komal Potdar	
			10m - 45m	**Thematic Keynotes** (topics from Globinar 1; 15 min each)	1.a Transboundary Collaboration		Fulong Chen		
					1.b Nature-Culture Linkages		Kay Van Damme		
2			45m - 1h30m	**Presentations from Competition Submissions** (10 min each)	Wulingyuan Scenic and Historic Interest Area (China) *The Wulingyuan Nature-Culture Lenses—an AR-based World Heritage interpretation system*	Hyeseung Shim	Anqi CHENG	Ragini Vishwas Karmarkar	Ji Young Jun Chunfeng Yang Joe Kallas Michelle Duong
					Sagarmatha (Mt Everest) National Park (Nepal) *Khumbu Care-Takers*		Paul Rogers		
					The Historic City of Ahmedabad (India) *iDiscover Ahmedabad - Voicing Untold Narratives*		Ester van Steekelenburg & Sameeha Sheth		
					Old Churches and Monasteries of Goa (India) *My Goa*		Milena Ivkovic		
3			1h30m - 2h10m	**Policy & Toolkit**	Policy Report Status	Hyeseung Shim	Divay Gupta	n/a	
					What is a Toolkit for World Heritage Sites?		Komal Potdar		
			2h10m - 2h15m	**Introduction to Panel Discussions**	Poll *Move into breakout rooms*		Hyeseung Shim		
		Breakout	2h15m - 3h15m	**Policy & Toolkit Panel Discussions** in parallel (breakout rooms)	1.1 Capacity Building & Networking	Susan Fayad	Gamini Wijesuriya	Kevin Hsu	Chunfeng Yang
					1.2 Tools in Monitoring & Interpretation	Georgios Toubekis	Yang Ruixia	Ragini Vishwas Karmarkar	Ji Young Jun
					1.3 Data Management & Open Source Data	Eugene Ch'ng	Fulong Chen	Komal Potdal	Andi Zhuang
4		Plenary	3h15m - 3h20m	**Transition to Networking**	Outgoing Poll /Wrapup + Group photo Intro to Industry Booths and Expert 1:1	Hyeseung Shim	n/a	n/a	Ji Young Jun Andi Zhuang Yu Zheng Chunfeng Yang
			3h20 - 4h	**Open Networking**	*in main room*		n/a		
				Industry & Sponsor Booths	Industry Sponsors (Miro)				
					Built Heritage Documentation Autumn School	ILUCIDARE	Alice Paladini and Jimena Quijano		
				Expert 1:1 (10 min per person)	CEO of Vizara Technologies: Expert in preservation of fragile heritage in digital space using tools and	Kevin Hsu Hyeseung Shim	Anupama Mallik		Michelle Duong Yu Zheng
					Special Advisor to the Director-General of ICCROM: Expert in Conservation and management of heritage, World Heritage and Capacity Building		Gamini Wijesuriya		
					Coordinator Heritage and Cultural Landscapes at the City of Ballarat: Expert in UNESCO Historic Urban Landscape - Community participation and sustainable cities		Susan Fayad		
					Vice President, ICOMOS ISCARSAH: Expert in Restoration & Conservation of Architectural Heritage		In-Souk Cho		
					KU Leuven	ILUCIDARE.eu: Expert in built heritage documentation, research & development and international collaboration		Aziliz Vandesande		

Session 2

OUR WORLD HERITAGE

Updated: 4/9/2021

REGISTRATION CLOSED

https://www.ourworldheritage.org/it_events/

TRANSFORMATIONAL IMPACTS OF INFORMATION TECHNOLOGY

GLOBINAR PROGRAMME

Saturday, April 10, 2021

SESSION 2

12:00 PM start in UTC +3 (Amman / Beirut / Istanbul)

Anchors: Aziliz Vandesande & Naa Dedei Tagoe

hour	Session		Time		Topics & Activities	Moderators	Speakers/Panellists	Rapporteurs	Technical Support
1	2	Plenary	0m - 10m	**Introduction**	Opening Remarks Icebreaker & Poll Introduce Keynotes	Aziliz Vandesande Naa Dedei Tagoe	Mario Santana Michelle Duong	Kaanan Thakkar	Michelle Duong Chunfeng Yang
			10m - 40m	**Thematic Keynotes** (topics from Globinar 1; 9 min each)	2.a Transboundary Collaboration		Francesco Bandarin, former Director of the World Heritage Centre Mariana Correia, President esGALLAECIA		
					2.b Nature-Culture Linkages		Riin Alatalu, Vice-President ICOMOS		
2			40m - 1h40m	**Presentations from Competition Submissions** (8 min each)	Town of Bamberg (Germany) *Mobile monuments*		Patricia Alberth		
					Kahuzi-Biega National Park (Democratic Rep. of Congo) *Camera Trap Technology*		Augustin Basabose, Primate Expertise Team		
					Walled Nicosia Buffer Zone (Cyprus) *project cyfa - Virtual Reality Experience within the Buffer Zone of Historic Walled Nicosia*		Fatmagul Oge & Andrea Giorgalli, Project CyFA		
					Historic Cairo (Egypt) Civil Monitoring		Tariq Al Murri, Historic Cairo Monitoring Team		
					Parc du Tassili N'Ajjer (Algerie) *Tassili N'ajjer, patrimoine Mondial à l'ère du digital : la gestion de la connaissance patrimoniale et le développement humain*		Zine-Eddine Seffadj		
					Wulingyuan Scenic and Historic Interest Area (China) *The Wulingyuan Nature-Culture Lenses—an AR-based World Heritage interpretation system*		Jing LI		
3			1h40m - 2h10m	**Policy & Toolkit**	Policy Report Status		Komal Potdar Haifaa Abedalhaleem	n/a	
					What is a Toolkit for World Heritage Sites?				
			2h10m - 2h15m	**Introduction to Panel Discussions**	Poll *Move into breakout rooms*				
		Breakout	2h15m - 3h15m	**Policy & Toolkit Panel Discussions** in parallel (breakout rooms)	2.1 Capacity Building & Networking	Aziliz Vandesande	Roberto Di Giulio & Giorgia Cesaro	Kaanan Thakkar	Chunfeng Yang
					2.2 Tools in Monitoring & Interpretation	Naa Dedei Tagoe	Luigi Barazzetti	Alice Paladini	Daniel Walber
					2.3 Data Management & Open Source Data	Marco Funari	Joaquín Garcia & Maurice Murphy	Sun Park	Aidan Bethell
					2.4 ARABIC: Tools, Data & Capacity Building	Joe Kallas	Zaki Aslan Haifaa Abedalhaleem Evan Fakhoury	Abdullah Alqaisi	Mais Karaki
4		Plenary	3h15m - 3h20m	**Transition to Networking**	Outgoing Poll Intro to Industry Booths and Expert 1:1	Aziliz Vandesande Naa Dedei Tagoe	n/a	n/a	Aidan Bethell Chunfeng Yang Mais Karaki
			3h20 - 4h	**Open Networking**	*in main room*		Moderator		
		Breakout		**Industry & Sponsor Booths**	Cloud-based Monitoring	Cintoo	Dominique	n/a	
					Industry (Miro)				
					Built Heritage Documentation Autumn School	ILUCIDARE	Jimena Quijano & Ludmila Albuquerque		
				Expert 1:1 (5 min per person)	Post emergency documentation of Beirut, Lebanon - Architect	Aziliz Vandesande Naa Dedei Tagoe	Joe Kallas	n/a	Daniel Walber Michelle Duong
					President esGALLAECIA - Expert in capacity building and Adobe Architecture		Mariana Correia		
					KEA European Affairs - Expert in policy making, networking and PR		Elisabetta Airaghi		
					Independent consultant RealVisuals - Expert Built Heritage Visualisation and VR		Alice Paladini		
					Principle Director, Architectural Heritage Division, INTACH		Divay Gupta		
					Chair of Friends of Soqotra (Yemen) - Expert in nature-culture linkages and Daphnia-aquatic ecology		Kay Van Damme		

Session 3

OUR WORLD HERITAGE

Updated: 4/9/2021

REGISTRATION CLOSED

https://www.ourworldheritage.org/it_events/

TRANSFORMATIONAL IMPACTS OF INFORMATION TECHNOLOGY

GLOBINAR PROGRAMME

Saturday, April 10, 2021

SESSION 3

12:00 PM start in UTC -2 (Nuuk) / 11:00 AM start in UTC -3 (São Paulo) / 2:00 PM start in UTC +0 (Accra)

Anchors: Haifaa Abedalhaleem & Kay Van Damme

hour	Session		Time		Topics & Activities	Moderators	Speakers/Panellists	Rapporteurs	Technical Support
1	3	Plenary	0m - 10m	**Introduction**	Opening Remarks Icebreaker & Poll Introduce Keynotes	Kay Van Damme	Haifaa Abedalhaleem Hyeseung Shim	Hilary Romaniuk	
			10m - 30m	**Thematic Keynotes** (topics from Globinar 1; 9 min each)	3.a Transboundary Collaboration		Youssouph Diedhiou		
					3.b Nature-Culture Linkages		Eugene Jo ICCROM		
2			30m - 1h30m	**Presentations from Competition Submissions** (8 min each)	Venice and Its Lagoon & Paris, Banks of the Seine (Italy & France) *Social Inclusion in Cultural Heritage Planning*	Kay Van Damme	Nan Bai, HEVA	Hilary Romaniuk	Daniel Walber Joe Kallas
					Archaeological Museum of Carmo (old Convent of Carmo), in Lisbon (Portugal) *Research projects at the Archaeological Museum of Carmo*		Javier Ortega, UMinho		
					Kilwa Kisiwani & Songo Mnara (United Rep. of Tanzania) *Sustainable Technologies for Conservation and Community Integration*		Stephanie Wynne-Jones		
					Vienna Historical Centre (Austria) *Mapping and Crowdsourcing*		Alzbeta Rejentova & Aristotelis Antoniou, Heritage for People		
					Mosi-oa-Tunya National Park / Victoria Falls (Zimbabwe) *Role of access control in improving the monitoring and interpretation of a World Heritage Site*		Rosie Mercer, Friends of the Falls		
					Hampi World Heritage Site, Hosapete, Karnataka (India) *Integrated Management Plans*		Sarath Chandra, GN Heritage Matters		
3			1h30m - 2h10m	**Policy & Toolkit**	Policy Report Status	Haifaa Abedalhaleem	Laurie Smith	n/a	
					What is a Toolkit for World Heritage Sites?				
			2h10m - 2h15m	**Introduction to Panel Discussions**	Poll *Move into breakout rooms*				
		Breakout	2h15m - 3h15m	**Policy & Toolkit Panel Discussions** in parallel (breakout rooms)	3.1 Capacity Building & Networking	Haifaa Abedalhaleem	Eugene Jo Souayibou Varissou	Hilary Grant	GUO Xiaotong
					3.2 Tools in Monitoring & Interpretation	Kay Van Damme	Yichuan Shi Rohit Jigyasu	Muhammad Rakeh Saleem	Daniel Walber
					3.3 Data Management & Open Source Data	Nazih Fino	Youssouph Diedhiou Bijan Rohani	Kitty Man	Joe Kallas
					3.4 PORTUGUESE: World Heritage, Capacity Building & Networking	Teresa Cunha Ferreira	Mariana Correia	Ludmila Albuquerque Daniele Paulino	Freed Gomes
4		Plenary	3h15m - 3h20m	**Transition to Networking**	Outgoing Poll Intro to Industry Booths and Expert 1:1	Kay Van Damme	n/a	n/a	GUO Xiaotong Freed Gomes
			3h20 - 4h	**Open Networking**	*in main room*		Moderator		
				Industry & Sponsor Booths	Cloud-based Monitoring	Cintoo	Dominique		
					Industry (Miro)				
					Built Heritage Documentation Autumn School	ILUCIDARE	Ludmila Albuquerque		
				Expert 1:1 (10 min per person)	Adaptive Reuse of Heritage Structures	Kay Van Damme	Daniele M S Paulino	n/a	Daniel Walber Michelle Duong
					Director of the World Heritage Centre		Mechtild Rössler		
					Post emergency documentation of Beirut, Lebanon - Architect		Joe Kallas		
					Structural Health Monitoring & Data Collection		Rebecca Napolitano		
					Eye tracking as a means for documentation		Muhammad Rakeh Saleem		
					KU Leuven	ILUCIDARE.eu – Expert in Built Heritage Documentation, Research & Development, Innovation and International Collaborations		Aziliz Vandesande		

Session 4

OUR WORLD HERITAGE

Updated: 4/9/2021

REGISTRATION CLOSED

https://www.ourworldheritage.org/it_events/

TRANSFORMATIONAL IMPACTS OF INFORMATION TECHNOLOGY

GLOBINAR PROGRAMME

Saturday, April 10, 2021

SESSION 4

12:00 PM start in UTC -7 (San Francisco / Vancouver)

Anchors: Douglas Pritchard, Mario Santana, & Sarah Chicone

hour	Session		Time		Topics & Activities	Moderators	Speakers/Panellists	Rapporteurs	Technical Support
1	4	Plenary	0m - 10m	**Introduction**	Opening Remarks Icebreaker & Poll Introduce Keynotes	Mario Santana	Christina Cameron	Kaneez Zehra Hassan	Michele Duong Daniel Walber Sabrinna Cox
			10m - 30m	**Thematic Keynotes** (topics from Globinar 1; 9 min each)	4.a Transboundary Collaboration		Douglas Pritchard		
					4.b Nature-Culture Linkages		Patricia O´Donnell		
2			30m - 1h30m	**Presentations from Competition Submissions** (8 min each)	Santa Cruz de Mompox Historic District (Colombia) *Historic District and Territory: Momposino Cultural Ecosystem*	Douglas Pritchard Mario Santana	**Andrés Gaviria Valenzuela,** Pontificia Universidad Javeriana, Bogotá	Kaneez Zehra Hassan Borna Rahmnay Farnood	
					El Sagrario (Old Cathedral) Church, Cuenca (Ecuador) *Real Time Monitoring for Structural Evaluation*		**Claudia Ortiz**		
					Ma'arrat al-Nu'man Museum (Syria) *ARTIVE and The Arc/k Project: Capacity Building in Documentation and Monitoring*		Brittany Delany, Khamal Patterson, **Scott Purdy**, Ariane Moser, Kathleen Kenyon		
					The Colonnade at Prince Battlefield State Park (USA) *Augmented Reality Performances at World Heritage Sites*		**Merli V. Guerra**, Heritage in Motion		
					Digital Preservation and Interpretive Education		**Ibrahim Tchan**		
3			1h30m - 2h10m	**Policy & Toolkit**	Policy Report Status	Douglas Pritchard	Rashmi Gajare Daniele M S Paulino	n/a	
					What is a Toolkit for World Heritage Sites?				
			2h10m - 2h15m	**Introduction to Panel Discussions**	Poll *Move into breakout rooms*				
4		Breakout	2h15m - 3h15m	**Policy & Toolkit Panel Discussions** in parallel (breakout rooms)	4.1 Capacity Building & Networking / Data Management & Open Source Data	Sarah Chicone	Douglas Comer, Mary McPartland, Catherine Lavoie, Rachel Fernandez	Kaneez Zehra Hassan	Isabelle Dillon-Sullivan
					4.2 Tools in Monitoring & Interpretation	Douglas Pritchard	Yiannis Avramides, Michael Schuller, Rebecca Napolitano	Kitty Man	Mais Karaki
					4.3 SPANISH Roundtable	Mario Santana	Claudia Cancino, Bernadette Devilat, José Bastante, Eduardo Escalante, Alejandra Albuerne, Fernando Montejo	Miquel Ortiz & Mara Cruz Michea	Nicolas Arellano
4		Plenary	3h15m - 3h20m	**Transition to Networking**	Outgoing Poll Intro to Industry Booths and Expert 1:1	Mario Santana	n/a	n/a	Aidan Bethell Isabelle Dillon-Sullivan Mais Karaki
			3h20 - 4h	**Open Networking**	*in main room*		Moderator		
				Industry & Sponsor Booths	Industry (Miro)				
					Built Heritage Documentation Autumn School	ILUCIDARE	tbc		
				Expert 1:1 (5 min per person)	The World Heritage System	Mario Santana Douglas Pritchard	Christina Cameron	n/a	Daniel Walber Joe Kallas
					Digital Storytelling and Virtual Reality		Katie Graham		
					Structural Health Monitoring & Data Collection		Rebecca Napolitano		
					Eye tracking as a means for documentation		Muhammed Rakeh Saleem		
					Adaptive Reuse of Heritage Structures		Daniele M S Paulino		

Closing Ceremony

OUR WORLD HERITAGE

Updated: 4/9/2021

REGISTRATION CLOSED

https://www.ourworldheritage.org/it_events/

TRANSFORMATIONAL IMPACTS OF INFORMATION TECHNOLOGY GLOBINAR PROGRAMME

Saturday, April 10, 2021

CLOSING SESSION

5:00 PM start in UTC -7 (San Francisco / Vancouver)
(8:00 PM Ottawa)

Anchors: Christina Cameron & Michelle Duong

hour	Session		Time	Topics & Activities		Moderators	Speakers/Panellists	Rapporteurs	Technical Support
1	Closing	Plenary	0m - 10m	**Introduction**	Opening Remarks Icebreaker & One-Word Poll Introduce Panellists	Christina Cameron Michelle Duong	Mario Santana Haifaa Abedalhaleem		Daniel Walber Sabrinna Cox Aidan Bethell
			10m - 50m	**Policy & Toolkit**	Summary of Panel Discussions	Michelle Duong	Daniele M S Paulino		
			50m - 1h20m	**Emerging Professionals Panel Discussion**		Christina Cameron	Chloe Pei *Borna Rahmnay Farnood* Efstathios Adamopolous Joe Kallas Peace Sasha Musonge Tennessee Mills	Muhammad Rakeh Saleem	
			1h20m - 1h45m	**Awards Ceremony - Announcement of Global Competition Winners**		Douglas Pritchard Rebecca Napolitano	Winners		
			1h45m - 2h	**Closing Remarks**	Next Steps	Christina Cameron			

Appendix E: The OWH IT Global Competition

Competitors of the Global Competition

Winners of the Global Competition (5)

Historic City of Ahmedabad, India | Team iDiscover Ahmedabad
Presentation, interpretation, and preservation of the old city based on a two-year pilot; storytelling project with a strong focus on lesser-heard voices of women and children.

Wulingyuan Scenic and Historic Interest Area in China | Tongji-HIST Heritage Landscape Conservation Team
Provides a new World Heritage experience with the application of contemporary information technologies to bridge the gap between world heritage and local communities that aims to develop a head-mounted mixed reality system.

Sagarmatha National Park in Nepal | Khumbu Caretakers
Project involves narrative and social media strategies to establish a 15-minute online happiness index survey of the local community in the face of climate change and dwindling wildlife populations. There will also be a tool for community engagement.

Ma'arrat al-Nu'man Museum, Syria | ARTIVE and the Arc/k Project
Aims to engage local communities near the museum to provide training and technical assistance in digital archiving photogrammetry and online registrations. Training can be accessed by average Syrians with affordable broadband devices and satellite internet.

Kahuzi-Biega National Park, Democratic Republic of Congo | Primate Expertise
Using camera traps for close surveillance of gorilla population and other animal species living there, using drones to monitor deforestation, poaching, logging, mineral extraction, and other illegal activities within targeted areas of the park.

Other Shortlisted Entries (4)

Mosi-oa-Tunya or Victoria Falls, Zambia and Zimbabwe | Friends of the Falls
Friends of the Falls assists site managers in cleaning the site, monitoring its status, and fundraising. They will work on integrating electronic ticketing, creating a website for the Falls and social media promotion, and using webcam monitoring of the Falls.

Sesia Val Grande UNESCO Global Geopark, Italy | Mantovani A, Lombardo V, Giardino M
Focuses on improving the selection and preservation of geo-heritage sites by creating a globally accepted definition of geo-heritage by creating a database to host information on geological features and provide transparency to decision-making processes.

El Sagrario Church in Ecuador | Catholic University of Cuenca and Team
This project creates a monitoring system that warns about physical and environmental threats. The system is structured by a network of wireless non-invasive sensors manufactured by open DIY hardware and software developed by multiple departments across the university.

Killwa Kisiwani and Songo Mnara in Tanzania | Wynne-Jones S, Mjema E, Perry S
The training of antiquities staff in social media on how to use it to engage with a wider audience. The design and construction of a Kiliwa region web resource for visitors will include local voices, guidelines for how to respect local culture and customs. Additionally, there will be training in photogrammetric mapping of heritage buildings into the Kilwa region for ongoing monitoring.

Other Competitors (27)

Lednice-Valtice Cultural Landscape, Czechia | Mendel University Socotra
Socotra from the Orbit – Remote sensing of Socotra WHS environment as a support tool for decision making

Sado Island, Niigata Prefecture, Japan | Eda Esempi di Architettura
Community projects on the Sado's Island in Japan: Rural landscape and Sasagawa's Village

The Ducal Palace in Guimaraes, Portugal | University of Minho
A Digital-based Integrated Methodology for the Preventive Conservation of Cultural Heritage

Town of Bamberg, Germany | Bamberg
GIS-based web application based on the inventory of Bamberg's listed monuments compiled by the Bavarian State Conservation Office.

Archaeological Museum of Carmo/Old Convent of Carmo, Lisbon, Portugal | UMinho
Historical research, geometrical surveys, non-destructive evaluation, and structural analysis works performed within the framework of the European Research Project (HWITHIN) and the SAHC Masters Course (Structural Analysis of Monuments and Historical Constructions).

Rock-Hewn Churches, Lalibela | Mesgia F S, WMF, Addis Ababa, Ethiopia
Monitoring technologies, and ground penetrating mechanisms for supervisory system.

Hampi World Heritage Site, Hosapete, Karnataka, India| Chandra and Team
Updating the Integrated Information Management System (IIMS).

Historic Cairo | H.C.M.T. Historic Cairo Monitoring Team
Monitor the world heritage site of Historic Cairo with the help of modern technology.

Abu Mena, Egypt | Tarek Waly Center
Virtual and augmented reality for Abu Mena Archaeological Site.

Walled Nicosia Buffer Zone, Cyprus | Project CyFA
An alternative experience to a specific urban corridor in the Nicosia Buffer Zone through a 'Virtual Reality Experience' (VRE).

Eight Columbian World Heritage Sites | Alejandra Escandón and Team
Online viewer and mobile app, built from the Ministry's database, whose sites will be uploaded on a georeferenced map.

Goa Old Town, India | My World Heritage Goa
Community-based heritage protection action through enhancement of immersive AR/VR platforms, including social media.

Lake Turkana National Parks, Kenya | National Museums of Kenya Consortium
Integrated Information Technology for Risk Management of WHS: baseline assessment of major environmental threats using remote sensing and real time data.

Zhoudoudian Peking Man Site, Beijing, China | Beijing University of Civil Engineering and Architecture and Team
Time-travelling Exploration of Cultural Heritage in the Past, Present, and Future: interpretation and immersive experiences of anthropological and archaeological data based on high-precision documentation.

Venice and Its Lagoon, Italy | HEVA Venice
Social Inclusion in Cultural Heritage Planning: A Computational Spatiotemporal Network Approach using User-Generated Content in Social Media Platforms

Old town of Beijing, Jingshan Subdistrict, China| Yang Jiang and Team
Developing a valid public participation mechanism for better conservation practices using PinStreet.

25 Sites within the bounds of Rapa Nui National Park, Chile | Consejo de Monumentos Nacionales (National Monuments Commission)
Active participation of local community in the digital documentation process: how to effectively monitor and identify changes in the conservation state of HS.

Historic Center of the City of Cuenca, Ecuador | Dirección de Áreas Históricas del Municipio de Cuenca
Developing a comprehensive and specific system for Heritage Management, focusing on the principles of knowing, planning, conserving, and disseminating.

Tassili N'Ajjer, Algeria | Seffadj Z-E, Senhadji D, Amokrane S
Designing an intermediate server as a multiservice platform, built on an interactive database. It is based on crowdsourcing (participatory production), optimizing, and enriching the knowledge base of historical monuments.

Saint-Louis World Heritage Site, Senegal | Lo C T, Sarr B, Rogers P
Narrative and social media strategies to deploy a survey for individual and destination well-being measurement.

Santa Cruz de Mompox Historic District, Colombia | Andrés Gaviria Valenzuela and Team
Comprehensive approach combining techniques for mapping and digitalization of the built space, considering aspects of the cultural landscape and community participation.

Galápagos Islands, National Park and Marine Reserve, Ecuador | Galápagos Infinito
Involvement of local community and visitors to monitor the local environment. In addition, capacity building and presentation of local history are integrated into this process.

Koutammakou, the land of the Batammariba, Togo-Benin | Ibrahim Tchan and Team
SACK (Koutammakou Conservation and Alert System) is a mobile application that will be used to identify, diagnose, describe the state of conservation, geo-locate and map the many types of Sikien / Tata Somba in Koutammakou.

The Colonnade at Princeton Battlefield State Park | Heritage in Motion
360-degree videography, combining history, technology, and dance, to create a site-specific Augmented Reality dance performance, viewable across the battlefield grounds on visitors' mobile devices.

Vienna Historical Centre, Austria | Heritage for People
Mapping / Cartography of global cultural sites.

British Fort, English Komenda, Ghana | University of Ghana, University of Mines and Technology, Ghana Museums and Monuments Board
Low-budget document and interpretation of site, including VR tour, interactive databases, and GIS.

Mount Robson Provincial Park (MRPP) and Protected Area, British Columbia, Canada | Kaitie Worobec, The Thompson Okanagan Tourism Association and Team
Narrative & social media strategies to deploy a 15-minute online Happiness Index survey.

Evaluation Criteria Rubrics

Letter of Intention Evaluation Criteria Rubric

Evaluation criteria	Under performance (1)	Fair (2)	Satisfactory (3)	Good (4)	Excellent (5)
Selected site	The site is inappropriate for this call.		The site may be appropriate for this call.		The site matches the call.
Team make up	The appropriate members have not been involved in this submission.	Only some of the appropriate members have been involved in this submission.	Most of the appropriate members have been involved in this submission.	The team includes community members in a cursory manner; other appropriate members have been involved in this submission.	The team includes community members in a central manner; other appropriate members have been involved in this submission.

Summary					
• **Core aims**	The core aims have not been discussed in this submission.	Only 1 of the aims has been discussed in this submission.		Both aims have been discussed in this submission.	Both aims have been discussed in this submission in a detailed manner.
• **Issues and challenges**	Issues and challenges have not been discussed in this submission.	Only some issues and challenges have been discussed in this submission; no discussion of how to mitigate these issues.	Appropriate issues and challenges have been discussed in this submission; no discussion of how to mitigate these issues.	Appropriate issues and challenges have been discussed; methods for mitigating these issues have been discussed in a cursory manner.	Appropriate issues and challenges have been discussed; methods for mitigating these issues have been discussed in a detailed manner.
Technologies	The technology is inappropriate for the needs of the site.		The technology may be appropriate for the needs of the site.		The technology matches the needs of the site.

Score = ____ / 25

Final Submission Evaluation Criteria Rubric

Evaluation criteria	Under performance (1)	Fair (2)	Satisfactory (3)	Good (4)	Excellent (5)
Team make up	The necessary members have not been involved.	Only some of the necessary members have been involved.	Most of the necessary members have been involved.	The team includes community members in a cursory manner; other necessary members have been involved.	The team includes community members in a central manner; other necessary members have been involved.
Technologies	The technology is inadequate for the needs of the site.		The technology may be adequate for the needs of the site.		The technology matches the needs of the site.
Description					

• **Core aims**	The core aims have not been discussed.	Only 1 of the aims has been discussed.		Both aims have been discussed.	Both aims have been discussed in a detailed manner.
• **Issues and challenges**	Issues and challenges have not been discussed.	Only some issues and challenges have been discussed; no discussion of how to mitigate these issues.	Issues and challenges have been discussed; no discussion of how to mitigate these issues.	Issues and challenges have been discussed; methods for mitigating these issues have been discussed in a cursory manner.	Issues and challenges have been discussed; methods for mitigating these issues have been discussed in a detailed manner.
• **Selected approach / methods**	Approaches and methods have not been identified.	Methods and approaches identified do not fit the needs of the site.	Methods and approaches have been identified but not discussed.	Methods and approaches have been discussed in a cursory manner.	Methods and approaches have been discussed in a detailed manner.
Implementation					
• **Needs identification (resources, tools, etc.)**	Needs have not been identified.	Needs identified do not fit the needs of the site.	Needs have been identified but not discussed.	Needs have been discussed in a cursory manner.	Needs have been discussed in a detailed manner.
• **Estimated budget**	No budget given.	Budget identified does not fit the needs of the site.	Items have been listed in the budget but not discussed / priced.	Items and budgeted amounts have been discussed/priced in a cursory manner.	Items and budgeted amounts have been discussed / priced in a detailed manner.

Score = ____ / 35

Appendix F: Matrix and Catalogue of Digital Tools, Methods, and Resources for Heritage Conservation, Interpretation, and Capacity Building

This appendix is a first version of a catalogue of digital technologies used in monitoring, documentation, and interpretation. The tools, methods, and resources presented in this list were largely collated by the team from experts, partners and participants during the webinars arranged for OurWorldHeritage debates. This catalogue and matrix may be further improved, aiming to produce a more refined and detailed version of an online catalogue of existing digital technologies, in consultation with experts, partners, and stakeholders.

How to refer to Appendix F:

This section is divided in three parts:

Part F.1: The tools and methods mentioned here can be used to produce digital assets of World Heritage properties for conservation, monitoring, and presentation/interpretation. Such production requires definite skills, resources, equipment, capacity building, and training.

Part F.2: This section includes institutions providing capacity building and resource support for the use of digital technologies.

Part F.3: This is a matrix that provides information on tools, technologies, institutions, and resources, and their applicability for the three actions (Conservation, Interpretation, and Capacity Building) across a variety of World Heritage properties. This categorization of the sites is based on the UNESCO Operational Guidelines 2019 Annex 3. The details of tools should be viewed in reference to Parts F.1 and F.2.

Appendix F Part F.1 Tools and Methods

A. PHOTOGRAPHIC DOCUMENTATION TOOLS, DEVICES, AND METHODS		
Definition: Photogrammetry comprises techniques for making measurements of real-world objects and terrain features with images and photographs as references. The photogrammetry tools collated were divided into two categories: camera devices and photographic methods. **Applications:** Applications for photographic documentation include measurement of coordinates, quantification of distances, heights, areas, and volumes, 3D topographic mapping, the extraction of 3D point clouds for surface reconstructions, and the generation of digital elevation models and orthophotographs. In addition, photographic documentation can include audio and video recording, to assist in the process of interpretation and presentation. **URL for information/applications:** #RCKeepsMemoriesAlive https://youtu.be/iMN9Kz9UmYY RealityCapture Tutorial: Alignment https://youtu.be/TG4tufXLHe8 Documenting the Thomas Jefferson Memorial https://youtu.be/wqFbsiDquas 혜승 심 Session 1 break Shikha Jain Tamil Nadu Temples https://youtu.be/aEQmE2d40uI The Use of Remotely Piloted Aircraft Systems for Historic Site Recording and Assessment https://youtu.be/E4etduNRlH8		
A.1	**CAMERA DEVICES AND METHODS**	
A.1.1	DSLR cameras	**Description:** DSLR Cameras to capture high resolution images, with varying shutter speed and ISO settings for photographic documentation, photogrammetry. **URL for tutorial/information:** Photogrammetry Workflow using a DSLR Camera https://scholarslab.lib.virginia.edu/blog/documentation-photogrammetry/ Getting started with Photogrammetry — with a Smartphone camera [2019] https://medium.com/realities-io/getting-started-with-photogrammetry-d0a6ee40cb72
A.1.2	360-degree cameras	**Description:** 360 cameras capture two images or video files from dual lenses with a 180-degree field of view and either automatically stitches them together in-camera or offers free companion software with which you can stitch the files together, often with one click. **URL for tutorial/information:** Pro2 3D Camera https://matterport.com/cameras/pro2-3D-camera 360 Capture Solutions for Any Job https://www.insta360.com/enterprise/industries/construction
A.1.3	Aerial photography	**Description:** An aerial photograph, in broad terms, is any photograph taken from the air with specially designed UAVs (Unmanned Aerial Vehicles). Usually air photos are taken vertically from an aircraft, RPAS

	devices (Drones, UAVs)	(Remotely Piloted Aircraft System), UAV, or drones using a highly accurate camera. **URL for tutorial/information:** The Use of Remotely Piloted Aircraft Systems for Historic Site Recording and Assessment https://youtu.be/E4etduNRlH8
A.1.4	Autonomous Underwater Vehicle	**Description:** An autonomous underwater vehicle (AUV) is an unmanned submersible vehicle that requires no real-time input or control from a human operator or driver and, therefore, operates autonomously. **URL for tutorial/information:** Benedetto Allotta MDM Zeno AUV Planning and executing underwater surveys https://youtu.be/yExxsFl3Krw Autonomous Underwater Vehicle https://www.sciencedirect.com/topics/earth-and-planetary-sciences/autonomous-underwater-vehicle
A.1.5	Infrared camera system	**Description:** A thermographic camera (also called an infrared camera, thermal imaging camera, or thermal imager) is a device that creates an image using infrared (IR) radiation, similar to a common camera that forms an image using visible light. **URL for tutorial/information:** Thermal Imaging Cameras Help Preserve Italy's Cultural Heritage https://www.flir.com/discover/instruments/moisture-restoration/thermal-imaging-cameras-help-preserve-italys-cultural-heritage/
A.1.6	Camera traps	**Description:** The modern camera trap is simply a digital camera connected to an infrared sensor that can see warm objects that are moving, like animals. **URL for tutorial/information:** Camera Trapping for Conservation https://www.wwf.org.uk/project/conservationtechnology/camera-trap Yourka detective work https://www.bushheritage.org.au/blog/yourka-detective-work!
A.2	**PHOTOGRAPHIC AND SCANNING METHODS**	
A.2.1	High Resolution Images	**Description:** Image resolution is typically described in pixels per inch (PPI), which refers to how many pixels are displayed per inch of an image. Higher resolutions mean that there more pixels per inch, resulting in more pixel information and creating a high-quality, crisp image. **URL for tutorial/information:**

		Spectral and 3D Cultural Heritage Documentation Using a Modified Camera https://www.int-arch-photogramm-remote-sens-spatial-inf-sci.net/XLII-2/1183/2018/
A.2.2	Photogrammetry	**Description:** Photogrammetry comprises techniques for making measurements of real-world objects and terrain features with images and photographs as references. **URL for tutorial/information:** [placeholder]
A.2.3	Close-range Photogrammetry	**Description:** Close-range photogrammetry (CRP) is photogrammetric data collection and processing where the subject is less than 1,000 feet away. Collection methods can be both ground- or aerial-based, and the final output can be rendered either two- or three-dimensionally. **URL for tutorial/information:** State of: Close-Range Photogrammetry https://www.xyht.com/lidarimaging/state-of-close-range-photogrammetry/
A.3	**OTHER COMPUTATIONAL PHOTOGRAPHIC METHODS**	
A.3.1	Mid Range 3D Laser Scanning (e.g. Zoller + Fröhlich, Faro, Leica)	**Description:** Laser Scanners measure distance accurately and repeatedly using a laser beam and the measured coordinates are used to form point cloud data. Mid-range 3D Laser Scanners are designed for mid-range measurement projects. They use either Time of Flight (TOF) or Phase Shift technology. In TOF scanning individual short pulses of laser radiation is emitted from the scanner and the time it takes for the pulse to travel to the object being scanned and return to the instrument is measured. In Phase Shift scanners, a continuous beam of laser radiation is emitted and the distance is calculated by measuring the phase shift between the emitted and received laser beams. **URL for tutorial/information:** Zoller + Fröhlich Laser Scanners https://www.zofre.de/en/laser-scanners Leica Geosystems Laser Scanners https://leica-geosystems.com/products/laser-scanners Faro Hardware Solutions https://www.faro.com/en/Products/Hardware

A.3.2	Reflectance Transformation Imaging (RTI)	**Description:** Reflectance Transformation Imaging (RTI) is a computational photographic method that captures a subject's surface shape and colour and enables the interactive re-lighting of the subject from any direction. RTI also permits the mathematical enhancement of the subject's surface shape and colour attributes. RTI, also known as Polynomial Texture Mapping (PTM), is a technique of imaging and interactively displaying objects under varying lighting conditions to reveal surface phenomena. The data acquisition method is Single Camera Multi Light (SCML). **URL for tutorial/information:** Reflectance Transformation Imaging (RTI) http://culturalheritageimaging.org/Technologies/RTI/
B. REMOTE SENSING AND SCANNING TOOLS		
Definition: Remote sensing is the process of detecting and monitoring the physical characteristics of an area by measuring its reflected and emitted radiation at a distance (typically from satellite or aircraft). **Applications:** Applications to documentation include measurement of coordinates, quantification of distances, heights, areas, and volumes, 3D topographic mapping, the extraction of 3D point clouds for surface reconstructions, and the generation of digital elevation models and orthophotographs. In addition, different types of sensors can be used to measure not only coordinates and assist in the documentation process, but also the monitoring process (such as vibration, acceleration, and stress levels of structures, etc.). **URL for information/applications:** Chen Yang Remote Sensing for Environment of Angkor Site HIST https://youtu.be/M_yjBTGZWkY		
B.1	**REMOTE SENSING AND GEODETIC TECHNIQUES**	
B.1.1	LiDAR: Light Detection and Ranging (Aerial, Bathymetric)	**Description:** LiDAR is a remote sensing process that collects measurements used to create 3D models and maps of objects and environments. Using ultraviolet, visible, or near-infrared light, LiDAR maps spatial relationships and shapes by measuring the time it takes for signals to bounce off objects and return to the scanner. **URL for tutorial/information:** LiDAR Key Tool for Preserving Cultural Heritage https://www.directionsmag.com/article/6807 esri Heritage Lidar https://www.arcgis.com/apps/MapJournal/index.html?appid=7385f666d2874e868b2e248d6867e233
B.1.2	Ground-based sensors: GB-InSAR, Fiber Bragg Grating (FBG), Ground	**Description:** Ground-based remote sensing uses a variety of geophysical survey techniques to see beneath the surface of the soil, providing a map of the underlying archaeological, alluvial, and geological features. One can cite the following sensors in this category: GB-InSAR, Piezometers, and GPRS.

	Penetrating Radar Systems (GPRS)	**URL for tutorial/information:** [placeholder]
B.1.3	Total Station Surveying	**Description:** A Total Station is an electronic/optical instrument used for surveying and building construction. It is an electronic transit theodolite integrated with electronic distance measurement (EDM) to measure both vertical and horizontal angles and the slope distance from the instrument to a particular point, with an on-board computer to collect data and perform triangulation calculations. **URL for tutorial/information:** Total Stations https://www.engineersupply.com/total-stations.aspx
B.1.4	Geodetic Techniques and Global Navigation Satellite Systems (GNSS)	**Description:** Geodesy is the science of accurately measuring and understanding the Earth's geometric shape, orientation in space, and gravity field. Geodesists must accurately define the coordinates of points on the surface of the Earth in a consistent manner. Global Navigation Satellite Systems (GNSS) include constellations of Earth-orbiting satellites that broadcast their locations in space and time, of networks of ground control stations, and of receivers that calculate ground positions by trilateration. **URL for tutorial/information:** Geodetic Techniques http://www.ga.gov.au/scientific-topics/positioning-navigation/geodesy/geodetic-techniques
B.1.5	Side-scan sonar	**Description:** Side-scan sonar is a category of sonar system that is used to efficiently create an image of large areas of the sea floor. **URL for tutorial/information:** Side Scan Sonar https://www.sciencedirect.com/topics/engineering/side-scan-sonar
B.1.6	Synthetic Aperture Radar	**Description:** Synthetic Aperture Radar (SAR) is a type of active data collection where a sensor produces its own energy and then records the amount of that energy reflected back after interacting with the Earth. While optical imagery is similar to interpreting a photograph, SAR data require a different way of thinking in that the signal is instead responsive to surface characteristics like structure and moisture. **URL for tutorial/information:** What is Synthetic Aperture Radar? https://earthdata.nasa.gov/learn/backgrounders/what-is-sar
B.2	**REMOTE MONITORING AND SENSORS**	
B.2.1	Remote Structural Health	**Description:** Accelerometers are used for the measurement of acceleration, shock, or vibration. Crack meters and joint meters are

	Monitoring (SHM) Sensors	used to monitor movement across surface cracks and joints in concrete, rock, soil, and other structures. An inclinometer or clinometer is an instrument used for measuring angles of slope (or tilt), elevation, or depression of an object with respect to gravity's direction. An extensometer is a device that is used to measure changes in the length of an object. It is useful for stress-strain measurements and tensile tests. **URL for tutorial/information:** Structural Health Monitoring of Heritage https://enviraiot.com/structural-health-monitoring-of-heritage/
B.2.2	Fire alarm systems	**Description:** [placeholder] **URL for tutorial/information:** VIDEO@OKUBO Map Sharing System for Fire Detection https://youtu.be/u9DZ8QXMrRE
C. INFORMATION MODELLING/CLOUD SERVICES & METHODS		
Definition: Modelling tools create a digital representation of objects and sites. Virtual reality (VR) immerses users in a fully artificial digital environment. Augmented reality (AR) overlays virtual objects in the real-world environment. Mixed reality (MR) not just overlays but anchors virtual objects to the real world. (https://www.forbes.com/sites/quora/2018/02/02/the-difference-between-virtual-reality-augmented-reality-and-mixed-reality/?sh=54637afc2d07). **Applications:** Digital models, virtual tours, websites, and other digital platforms. **URL for information/applications:** Connecting Two Worlds - Hybrid VR and AR System https://youtu.be/oOa0HRnmFlk Vizara ViRaasat Vittala & Ramchandra Temple, HAMPI (Indian Digital Heritage, DST project) https://youtu.be/yEe3ue6Mfp8 Augtraveler - A Culture and Heritage Travel Tech Platform https://youtu.be/rTNotZA1h60		
C.1	3D-Modelling, Augmented/Virtual/ Mixed Reality	**Description:** 3D modelling can be defined as the use of software to create a virtual three-dimensional model of some physical object. To create more realistic models, it can be associated with other techniques, such as point clouds, photogrammetry, LiDAR, etc. 3D models and other media can be used to create augmented, virtual, and mixed reality experiences that are aimed to be immersive for users. They can vary in their level of immersion and layering with reality. **Examples of Software/App:** Matterport, BIM software, e.g. Revit, BIM 360, ArchiCAD, LiDAR, photogrammetry **URL for tutorial/information:** 3D Modelling

		https://www.recover-urban-heritage.org/3d-modeling/ TimeLooper - a 360-degree location-based virtual reality mobile platform and app that lets visitors re-live iconic moments from historical & cultural sites. https://www.timelooper.com/
C.2	World-simulation and Immersive Games (UNREAL and UNITY, Minecraft)	**Description:** The application of video games to heritage conservation essentially takes advantage of the already-built game engines, the diffusion and marketing structures linked with those games, the allegiance of large user communities, and the capacity to interact in complex 3D scenarios. **Examples of Software/App:** Minecraft https://www.minecraft.net **URL for tutorial/information:** Minecraft History & Culture Kit https://education.minecraft.net/en-us/resources/history-and-culture-subject-kit Resonant: An Immersive Game for Connecting People to Cultural Heritage https://youtu.be/Q1kXcQMasEk Music for the King of Scots: The Pleasure Palace of James IV https://youtu.be/ZtXrE_cFit8 Virtual Reconstruction https://vimeo.com/90651206 Reconstrucción virtual https://vimeo.com/90237585 inhabiting ruins https://vimeo.com/213271664
C.3	Virtual-Tour Platforms	**Description:** Virtual-tour platforms allow the use of images and videos, or other techniques (point cloud recording, LiDAR, etc.) to represent a site/spatial area. **Examples of Software/App:** Kuula https://kuula.co/ Theasys https://www.theasys.io/ Matterport https://matterport.com/ **URL for tutorial/information:** Heritage World Tours https://www.eyerevolution.co.uk/heritage/ Google offers virtual tours of UNESCO World Heritage sites https://www.engadget.com/google-arts-and-culture-unesco-world-heritage-sites-virtual-tours-150020015.html
C.4	Facial and gesture modelling	**Description:** [placeholder] **URL for tutorial/information:** When IN_TANgible Cultural Heritage becomes digital https://youtu.be/Kn-O77-3ijo *(Search for more focussed examples)*
C.5	Speech synthesis	**Description:** [placeholder]

		URL for tutorial/information: When IN_TANgible Cultural Heritage becomes digital https://youtu.be/Kn-O77-3ijo *(Search for more focussed examples)*
C.6	Cloud-based Scan & BIM (Building Information Modelling) Platforms	**Description:** Cloud-based Scan & BIM Platforms allow storage of point-cloud data collected from a laser scanner and its appropriate building information model directly on a cloud from anywhere using an internet connection. It allows architects, engineers, and contractors to easily access their 3D models from virtually anywhere. Storing scanned data and BIM information on a cloud means stakeholders can upload and access the latest version of their models and work from a single, up-to-date source. **Example of Software/App:** Cintoo Cloud - a complete cloud-based, collaborative Scan & BIM platform to manage and distribute your laser scan data with no compromise to accuracy https://cintoo.com/
D. GEOSPATIAL MAPPING SYSTEMS		
Definition: A geographic information system (GIS) is a system that creates, manages, analyzes, and maps many types of geospatial data. GIS connects data to a map, integrating location data with descriptive information. **Applications:** It can be used to collect and store geospatial data on WHS, contributing to the development of digital platforms for monitoring and interpretation. **URL for information/applications:** Chen Yang Our World Heritage Great Wall Video https://www.youtube.com/watch?v=f9mtiHFBC4k		
D.1	ArcGIS (ArcMap, ArcScene, ArcGlobe, ArcCatalog)	**Description:** ArcGIS is a geographic information system (GIS) application developed and maintained by the American company Esri. It provides tools for the creation of the map and spatial data used in GIS, including the ability to edit geodatabase files and data, multiuser geodatabase editing, versioning, raster data editing, vectorization, and advanced vector data editing, etc. **URL:** ArcGIS Online https://www.arcgis.com/index.html
D.2	QGIS	**Description:** Free software with an open-source, cross-platform, geographic information system that allows the visualization, editing, and analysis of georeferenced data. **URL:** QGIS https://qgis.org/en/site/
D.3	OpenStreetMap (OpenHistoricalMap)	**Description:** It provides access to a dataset for Geographic Information Systems. The data is free and reliable. The Open

		Historical Map allows the user to store and display map data throughout the history of the world. **URL:** OpenStreetMap https://www.openstreetmap.org/
D.4	Google Earth	**Description:** Google Earth shows a 3D representation of the earth based on satellite imagery. **URL:** Google Earth https://earth.google.ca/
D.5	Google Street View	**Description:** Google Street View provides a perspective at walking height using interactive panoramic images. **URL:** Street View Map https://maps.google.com/maps/
D.6	USGS Land Satellite Imagery	**Description:** Since 1972, the joint NASA/U.S. Geological Survey Landsat series of Earth Observation satellites have continuously acquired images of the Earth's land surface, providing uninterrupted data to help land managers and policymakers make informed decisions about natural resources and the environment. Landsat is a part of the USGS National Land Imaging (NLI) Program. Landsat data is processed and hosted at the USGS Earth Resources Observation and Science (EROS) Center. **URL:** Landsat Missions https://www.usgs.gov/core-science-systems/nli/landsat

Appendix F Part F.2 Institutions and Resources

E. INSTITUTIONAL RESOURCES, REFERENCE MANAGEMENT SYSTEMS, AND CAPACITY BUILDING PROGRAMS		
E.1	**INTERNATIONAL UNIVERSAL AGENCIES AS RESOURCES FOR THEORY, POLICY SUPPORT, AND CAPACITY BUILDING**	
E.1.1	Getty Conservation Institute (GCI)	**Description:** The Getty Conservation Institute (GCI) is a program of the J. Paul Getty Trust. It is a private international research institution dedicated to advancing conservation practice through the creation and delivery of knowledge. **URL:** Getty Conservation Institute https://www.getty.edu/conservation
E.1.2	International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM)	**Description:** ICCROM is an intergovernmental organization working in service to its Member States to promote the conservation of all forms of cultural heritage, in every region of the world. It operates in the spirit of the 2001 UNESCO Universal Declaration on Cultural Diversity. **URL:** International Centre for the Study of the Preservation and Restoration of Cultural Property https://www.iccrom.org/
E.1.3	International Council on Monuments and Sites (ICOMOS)	**Description:** ICOMOS is a non-governmental international organisation dedicated to the conservation of the world's monuments and sites. **URL:** International Council on Monuments and Sites https://www.icomos.org/
E.1.4	International Union for Conservation of Nature (IUCN) World Heritage Outlook	**Description:** IUCN's World Heritage Outlook provides the first global assessment of the conservation prospects for natural World Heritage. By assessing every natural site with World Heritage status, it recognises good conservation practice and supports the role of World Heritage sites in demonstrating excellence. It also identifies the actions needed to support sites that are facing threats, in order to improve their conservation outlook. **URL:** IUCN World Heritage Outlook https://worldheritageoutlook.iucn.org/
E.1.5	UNESCO International Centre on Space Technologies for Natural and Cultural Heritage (HIST)	**Description:** The International Center on Space Technology for Natural and Cultural Heritage (HIST) is the first of its kind to apply space technologies for monitoring and preserving natural and cultural heritage under the auspices of UNESCO.

		URL: International Center on Space Technology for Natural and Cultural Heritage under the Auspices of UNESCO http://english.radi.cas.cn/Cooperation/ISTP/HIST/ Report for the 38 Session of the World Heritage Committee https://whc.unesco.org/document/128236
E.2	**OTHER INSTITUTIONS**	
E.2.1	ALIPH Foundation	**Description:** ALIPH was created to act in favour of cultural heritage in conflict areas via an aid programme, which enables it to be flexible and to react quickly. **URL:** International alliance for the protection of heritage in conflict areas https://www.aliph-foundation.org/
E.2.2	Arcadia Foundation	**Description:** Arcadia supports work to preserve endangered cultural heritage, protect endangered ecosystems, and promote access to knowledge. **URL:** ARCADIA https://www.arcadiafund.org.uk/
E.2.3	Arches	**Description:** Arches is an open-source software platform developed jointly by the Getty Conservation Institute and World Monuments Fund for cultural heritage data management. **URL:** Arches Project Cultural Heritage Inventory and Management Software https://www.archesproject.org/
E.2.4	Biodiversity and Protected Areas (BIOPAMA) Reference Information System (RIS) Management	**Description:** The BIOPAMA (Biodiversity and Protected Areas Management) Reference Information System (RIS) is a web-based, open-source information system for protected areas across 79 countries of the African, Caribbean, Pacific (ACP) Group of States. **URL:** BIOPAMA RIS https://rris.biopama.org/
E.2.5	Capacity Building Workshop on Nature-Culture Linkages in Asia and the Pacific (CBWNCL)	**Description:** The purpose of the CBWNCL is to contribute to the World Heritage Capacity Building Programme led by ICCROM and IUCN, in consultation with ICOMOS and the UNESCO World Heritage Centre, in developing new approaches towards integrated conservation of cultural and natural heritage. **URL:** Nature-Culture Linkages in Heritage Conservation in Asia-Pacific https://www.iccrom.org/courses/nature-culture-linkages-heritage-conservation-asia-pacific
E.2.6	Caribbean Capacity Building Programme (CCBP)	**Description:** The Caribbean Capacity Building Programme (CCBP) is a long-term training programme focusing on cultural

		heritage management and aiming to create a Caribbean network of heritage experts. **URL:** Caribbean Capacity Building Programme (CCBP) https://whc.unesco.org/en/activities/475/
E.2.7	China Intangible Cultural Heritage Network	**Description:** ICCHINA.CN (China Intangible Cultural Heritage Network and China Intangible Cultural Heritage Digital Museum) is a non-profit intangible cultural heritage protection website under the leadership of the Ministry of Culture of the People's Republic of China, and sponsored by the China Academy of Arts to promote the protection of China's intangible cultural heritage. This website aims to use digital technology and internet platforms to display and disseminate professional knowledge of intangible cultural heritage in China and all over the world, showcasing the country's profound and rich intangible cultural heritage resources. The information exchange of cultural heritage protection work condenses the concept and theoretical consensus of intangible cultural heritage protection practice, fully mobilizes and utilizes the academic, economic, public opinion resources of the whole society and the participation of the public to promote the protection of China's intangible cultural heritage work. At the same time, the website will promptly demonstrate the government's laws and policies on the protection of intangible cultural heritage, as well as the research results and work experience of academic institutions and protection institutions to guide the country's intangible cultural heritage conservation. Heritage-related workers and volunteers carry out the protection and research of intangible cultural heritage and provide an effective communication platform. **URL:** China Intangible Cultural Heritage Network and China Intangible Cultural Heritage Digital Museum (note that this website is only available in Chinese). www.ihchina.cn
E.2.8	CIPA Heritage Documentation	**Description:** CIPA Heritage Documentation is a dynamic international organisation that has twin responsibilities: keeping up with technology and ensuring its usefulness for cultural heritage conservation, education, and dissemination. **URL:** CIPA Heritage Documentation https://www.cipaheritagedocumentation.org/
E.2.9	CyArk	**Description:** CyArk is a non-profit organization founded in 2003 to digitally record, archive, and share the world's most

		significant cultural heritage and ensure that these places continue to inspire wonder and curiosity for decades to come. **URL:** CyArk https://www.cyark.org/
E.2.10	Digital Heritage Research Lab (DHRLab)	**Description:** The Digital Heritage Research Lab (DHRLab) was established in 2013 at the Department of Electrical Engineering and Information Technology of the Cyprus University of Technology. The lab is devoted to research on the digitization, documentation, archiving, preservation, protection, and promotion of the tangible and intangible Cultural Heritage remains of our past. **URL:** Digital Heritage Research Laboratory https://digitalheritagelab.eu/
E.2.11	Esri	**Description:** Esri is an international supplier of geographic information system software, web GIS and geodatabase management applications. **URL:** Esri https://www.esri.com/en-us/home
E.2.12	Google Arts and Culture	**Description:** Google Arts & Culture is a non-profit initiative. They work with cultural institutions and artists around the world to preserve and bring the world's art and culture online so it's accessible to anyone, anywhere. **URL:** Google Arts & Culture https://artsandculture.google.com/
E.2.13	Greenpeace Global Mapping Hub	**Description:** The main goal of the Greenpeace Global Mapping Hub is to create additional values for Greenpeace activities, systematically providing advice on GIS services that can be used by Greenpeace offices and projects. **URL:** Global Mapping Hub by Greenpeace https://maps.greenpeace.org/
E.2.14	Historic American Building Survey (HABS) and Historic American Engineering Record (HAER)	**Description:** HABS and HAER collections are among the largest and most heavily used in the Prints and Photographs Division of the Library of Congress. The collections document achievements in architecture, engineering, and landscape design in the United States and its territories. **URL:** Historic American Buildings Survey/Historic American Engineering Record/Historic American Landscapes Survey https://www.loc.gov/pictures/collection/hh/
E.2.15	HUL Ballarat and Visualising Ballarat	**Description:** HUL Ballarat and Visualising Ballarat online tools are collaborative programs contributed to by a number of organizations. They have been established from seed funding by the City of Ballarat and developed by the Centre for eResearch and Digital Innovation (CeRDI) Federation University Australia. **URLs:** Historic Urban Landscape Ballarat

		http://www.hulballarat.org.au/ Visualising Ballarat http://www.visualisingballarat.org.au/
E.2.16	The International Information and Networking Centre for Intangible Cultural Heritage in the Asia-Pacific Region under the auspices of UNESCO (ICHCAP) ichLinks	**Description:** ICHCAP was established as a UNESCO Category 2 centre in 2011. It runs information and networking programs to support UNESCO's strategic plans among the forty-eight Member States of the Asia-Pacific region. In addition, it maintains an Integrated ICH Information-Sharing Platform in the Asia-Pacific Region, the ichLinks. ichLinks is a one-stop online platform where you can easily find a wide range of intangible cultural heritage (ICH) information and content shared by, and with, Asia-Pacific Member States. **URL:** ichLinks https://www.ichlinks.com/index.do
E.2.17	International Society for Photogrammetry and Remote Sensing (ISPRS)	**Description:** The International Society for Photogrammetry and Remote Sensing is a non-governmental organization devoted to the development of international cooperation for the advancement of photogrammetry and remote sensing and their applications. **URL:** International Society for Photogrammetry and Remote Sensing https://www.isprs.org/
E.2.18	Key Laboratory of Information Technology for Architectural Cultural Inheritance, Tianjin University, China	**Description:** The laboratory is one of 18 key laboratories approved by the Ministry of Culture. The laboratory is supported by the School of Architecture, the School of Software, the School of Computer, and the Wang Xuezhong Art Research Institute. It is committed to cultivating compound talents with interdisciplinary backgrounds and serving the historical responsibility of "Cultural Renaissance" in China. The laboratory was established through the multi-disciplinary advantages of architecture + humanity + technology. Supported by international and domestic advanced technologies and techniques, the lab created an information technology platform for preserving architectural cultural heritage. **URL:** Key Laboratory of Information Technology for Architectural Cultural Inheritance, Ministry of Culture and Tourism http://heritlab.tju.edu.cn/ (EN) http://heritlab.tju.edu.cn/index-English.jsp?urltype=tree.TreeTempUrl&wbtreeid=1336
E.2.19	PANORAMA	**Description:** PANORAMA – Solutions for a Healthy Planet is a partnership initiative to document and promote examples of inspiring, replicable solutions across a range of conservation

		and sustainable development topics, enabling cross-sectoral learning and inspiration. **URL:** PANORAMA – Solutions for a Healthy Planet https://panorama.solutions/en/portal/nature-culture
E.2.20	The International Training Course (ITC) on Disaster Risk Management of Cultural Heritage	**Description:** The International Training Course (ITC) on Disaster Risk Management of Cultural Heritage is the principal educational project of the Chair Programme. ITC has been conducted annually under this UNESCO Chair since 2006. The target groups for this course include government institutions, departments, universities, NGOs, and private consultants from cultural heritage, as well as relevant disaster management fields. **URL:** UNESCO Chair on Cultural Heritage and Risk Management / ITC, Ritsumeikan University https://rdmuch-itc.com/
E.2.21	Sustainable Cultural Heritage Through Engagement of Local Communities Project (USAID SCHEP)	**Description:** USAID's Sustainable Cultural Heritage Through Engagement of Local Communities Project (SCHEP), implemented by the American Center of Oriental Research (ACOR), aims to achieve effective and sustainable preservation, management, and development of Cultural Heritage Resources in Jordan. **URL:** USAID SCHEP http://usaidschep.org/en

Appendix F Part F.3 Information Technology Matrix for World Heritage: Digital Tools, Methods and Resources for Conservation, Interpretation, and Capacity Building

This is a matrix of existing tools, technologies, institutions, and resources, and their applicability for the three actions (Conservation, Interpretation, and Capacity Building) across a range of types of World Heritage properties. This categorization of the sites is based on the UNESCO Operational Guidelines 2019 Annex 3. The details of tools should be viewed in reference to parts F.1 and F.2 above.

Appendix F Part F.3 Information Technology Matrix for World Heritage			**Legend**	● Conservation and monitoring ■ Interpretation and storytelling ♦ Capacity building									
IN.	**CAT. OF TOOL**	**No.**	**Tools/Softw./Plat./Inst.**	**(G)M**	**CL**	**MS**	**NH**	**HT**	**AS**	**UA**	**HC**	**HR**	**ICH**
INDEX	CATEGORY OF TOOL	No.	TOOLS/ SOFTWARES/ OPEN PLATFORMS/ INSTITUTIONS	TYPE OF PROPERTY AS PER THE UNESCO OPERATIONAL GUIDELINES 2019 AND CATEGORIZATION									
				(GROUP OF) MONUMENT(S)	CULTURAL LANDSCAPE	MIXED SITE	NATURAL HERITAGE	HISTORIC TOWN	ARCHAOELOGICAL SITE	UNDERWATER ARCHELOGY	HERITAGE CANALS	HERITAGE ROUTES	INTANGIBLE CULTURAL HERITAGE
A	**PHOTOGRAPHIC DOCUMENTATION TOOLS, DEVICES, AND METHODS**	**A.1.**	**CAMERA DEVICES AND METHODS**										
		1	DSLR cameras	●■	●■	●■	●■	●■	●■	●■	●■	●■	●■
		2	360-degree cameras	●■	●■	●■	●■	●■	●■	●■	●■	●■	
		3	Aerial photography devices	●■	●■	●■	●■	●■	●■	●■	●■	●■	
		4	Autonomous Underwater Vehicle							●■			
		5	Infrared camera system	●■	●■	●■	●■	●■	●■	●■	●■	●■	●■

Appendix F Part F.3 Information Technology Matrix for World Heritage			Legend	● Conservation and monitoring ■ Interpretation and storytelling ♦ Capacity building									
IN.	**CAT. OF TOOL**	**No.**	**Tools/Softw./Plat./Inst.**	**(G)M**	**CL**	**MS**	**NH**	**HT**	**AS**	**UA**	**HC**	**HR**	**ICH**
		6	Camera traps	●	●	●	●	●	●				
		A.2.	**PHOTOGRAPHIC AND SCANNING METHODS**										
		1	High Resolution Images	●■	●■	●■	●■	●■	●■		●■	●■	●■
		2	Photogrammetry	●■	●■	●■	●■	●■	●■		●■	●■	●■
		3	Close-range Photogrammetry	●■	●■	●■	●■	●■	●■		●■	●■	●■
		A.3.	**OTHER COMPUTATIONAL PHOTOGRAPHIC METHODS**										
		1	Mid Range 3D Laser scanning	●■	●■	●■	●■	●■	●■	●■	●■	●■	
		2	RTI	●■	●■	●■	●■	●■	●■	●■	●■	●■	
B	**REMOTE SENSING AND SCANNING TOOLS**	**B.1.**	**REMOTE SENSING AND GEODETIC TECHNIQUES**										
		1	LiDAR	●■	●■	●■	●■	●■	●■		●■	●■	
		2	Ground-based sensors: GB-InSAR, FBG, GPRS	●■	●■	●■		●■	●■		●■	●■	
		3	Total Station Surveying	●	●	●	●	●	●		●	●	
		4	GNSS	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	
		5	Side-scan sonar	●■	●■	●■	●■	●■	●■	●■	●■	●■	
		6	Synthetic Aperture Radar	●■	●■	●■	●■	●■	●■	●■	●■	●■	
		B.2.	**REMOTE MONITORING AND SENSORS**										
		1	Remote SHM Sensors	●		●		●	●		●	●	
		2	Fire alarm systems	●		●		●	●		●	●	

Appendix F Part F.3 Information Technology Matrix for World Heritage			**Legend**	● Conservation and monitoring ■ Interpretation and storytelling ♦ Capacity building									
IN.	**CAT. OF TOOL**	**No.**	**Tools/Softw./Plat./Inst.**	**(G)M**	**CL**	**MS**	**NH**	**HT**	**AS**	**UA**	**HC**	**HR**	**ICH**
C	**INFORMATION MODELLING/ CLOUD SERVICES & METHODS**	**C.**	**INFORMATION MODELLING/CLOUD SERVICES & METHODS**										
		1	3D-Modelling, AR/VR/MR	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦
		2	World-simulation and Immersive Games	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦
		3	Virtual-Tour Platforms	■♦	■♦	■♦	■♦	■♦	■♦	■♦	■♦	■♦	■♦
		4	Facial and gesture modelling										●■
		5	Speech synthesis										●■
		6	Cloud-based Scan & BIM Platforms	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦
D	**GEOSPATIAL MAPPING SYSTEMS**	**D.**	**GEOSPATIAL MAPPING SYSTEMS**										
		1	ArcGIS etc.	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦
		2	QGIS	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦
		3	OpenStreetMap	■♦	■♦	■♦	■♦	■♦	■♦		■♦	■♦	
		4	Google Earth	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦
		5	Google Street View	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦		●■♦	●■♦	●■♦
		6	USGS Land Satellite Imagery	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	
E	**INSTITUTIONAL RESOURCES, REFERENCE MANAGEMENT SYSTEMS, AND CAPACITY**	**E.1.**	**INTERNATIONAL UNIVERSAL AGENCIES AS RESOURCES FOR THEORY, POLICY SUPPORT, AND CAPACITY BUILDING**										
		1	Getty Conservation Institute	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦
		2	ICCROM	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦		●■♦	●■♦	●■♦

Appendix F Part F.3 Information Technology Matrix for World Heritage			Legend	● Conservation and monitoring ■ Interpretation and storytelling ♦ Capacity building									
IN.	**CAT. OF TOOL**	**No.**	**Tools/Softw./Plat./Inst.**	**(G)M**	**CL**	**MS**	**NH**	**HT**	**AS**	**UA**	**HC**	**HR**	**ICH**
	BUILDING PROGRAMS	3	ICOMOS	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦
		4	IUCN World Heritage Outlook	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦
		5	UNESCO - HIST	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦
		E.2.	**OTHER INSTITUTIONS**										
		1	ALIPH Foundation	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
		2	Arcadia Foundation	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
		3	Arches	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦
		4	BIOPAMA RIS Management	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦
		5	CBWNCL	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
		6	CCBP	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
		7	China Intangible Cultural Heritage Network	■♦	■♦	■♦	■♦	■♦	■♦	■♦	■♦	■♦	■♦
		8	CIPA Heritage Documentation	●♦				●♦	●♦	●♦	●♦	●♦	
		9	CyArk	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦
		10	DHRLab	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦	●♦
		11	ESRI	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦
		12	Google Arts and Culture	■♦	■♦	■♦	■♦	■♦	■♦		■♦	■♦	■♦
		13	Greenpeace Global Mapping Hub		●♦	●♦	●♦						

Appendix F Part F.3 Information Technology Matrix for World Heritage			**Legend**	● Conservation and monitoring ■ Interpretation and storytelling ♦ Capacity building									
IN.	**CAT. OF TOOL**	**No.**	**Tools/Softw./Plat./Inst.**	**(G)M**	**CL**	**MS**	**NH**	**HT**	**AS**	**UA**	**HC**	**HR**	**ICH**
		14	HABS - HAER	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦
		15	HUL Ballarat and Visualising Ballarat	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦		●■♦	●■♦	●■♦
		16	ICHCAP - ichLinks	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦
		17	ISPRS	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
		18	Key Lab. of IT for Architectural Cultural Inheritance	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦	●■♦
		19	PANORAMA	●♦	●♦	●♦	●♦	●♦	●♦		●♦	●♦	
		20	The ITC on Disaster Risk Management of Cultural Heritage	●♦	●♦	●♦	●♦	●♦	●♦		●♦	●♦	
		21	USAID SCHEP	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦