Towards a Holistic Documentation and Wider Use of Digital Cultural Heritage

Marinos Ioannides(✉) and Robert Davies

Cyprus University of Technology, Limassol, Cyprus
marinos.ioannides@cut.ac.cy

Abstract. This paper reviews work currently undertaken and planned to develop a more holistic approach to e-documentation of Cultural Heritage, thereby addressing the needs of a wider range of existing and potential audiences in the digital sphere. Building on the work of the ViMM Coordination and Support Action, funded under Horizon 2020, Digital Heritage Research Laboratory (DHRLab) at Cyprus University of Technology (CUT) has committed its research agenda for the years to come to the development these approaches, settings in train this vital process through three main mechanisms, aiming to create a holistic framework for DCH by carrying out the wide range of collaborative and multidisciplinary research needed within an overall construct of advanced documentation:

1. The Europeana Task Force on Advanced Documentation of 3D digital assets
2. The UNESCO Chair on Digital Heritage
3. The Mnemosyne European Research Area Chair on Digital Heritage (Horizon 2020).

Keywords: Digital Heritage · Holistic · e-Documentation

1 Introduction

At present, Digital Cultural Heritage (DCH) objects are not e-documented adequately to provide the knowledge and data needed by many potential target audiences. Complete knowledge and the story of the past are not available. In particular, e-documentation of monuments and/or 3D artefacts/museum objects, usually helps digitise the tangible aspects rather than the intangible. Yet in many cases, the outstanding value of cultural heritage assets is their intangible stories.

Documentation of the almost 1000-year-old Asinou church in Cyprus UNESCO, World Heritage-listed due to the outstanding artistic value of the frescos, exemplifies this [1]. This CH asset is characterized as one of the most important churches and monasteries of the former Byzantine Empire, richly decorated with murals and providing an overview of Byzantine and post-Byzantine painting in Cyprus, representing a globally unique artistic expression and technique. However, these aspects are not preserved for the generations to come, neither are the materials and structural analysis of the monument documented.

E. Garoufallou et al. (Eds.): MTSR 2018, CCIS 846, pp. 76–88, 2019.
https://doi.org/10.1007/978-3-030-14401-2_7

In general, archaeological sites are often only fully represented in a 3D geometrical record. Their story and historical value is not documented. As a result, experts, professional and others accessing major sources such as Europeana, the EU digital cultural heritage library, are not able to discover this kind of information.

The research challenges cover a lifecycle of DCH facets [2], including those concerning:

- Data acquisition (tangible and intangible/stories)
- Data processing (enrichment of metadata)
- Modelling
- Knowledge management (interpretation)
- Preservation
- Use and re-use

Obstacles which need to be overcome include:

- A lack of standards and proven approaches, particularly in areas such as 3D, intangible heritage and digital storytelling;
- The need to establish greater interoperability with developments in technical fields such as Big Data infrastructures, the use of open data and Artificial Intelligence/Machine Learning, and innovations and advances in the state-of-the-art in VR/AR, in order to better enable their application to Cultural Heritage resources;
- Simplification of technology pipelines for end-users, including those working in local digitisation initiatives across Europe;
- Optimisation of the use of geospatial technologies in the field of Cultural Heritage to improve the impact and audience reach of projects such as Europeana;
- Scarcity of trained and qualified human resources and the resulting skills.

2 The Role of ViMM

Virtual Multimodal Museum (ViMM) is a major Coordination and Support Action (CSA), funded under the European Union (EU) Horizon 2020 programme (CULT-COOP-8-2016), with a duration of 30 months (October. 2016–March 2019) engaging a large number of key stakeholders and communities of practices on how to improve collaboration and comprehension among the entire community, in order to build up a common roadmap for future activities. ViMM brings together Europe and the world's leading public and private sector organisations working on Virtual Museums and in the wider sector of Digital Cultural Heritage (DCH), aiming to promote high quality policy development, decision making and the use of technical advances.

Major results include:

- A highly interactive and wide-reaching ViMM communication Platform[1];
- Key events at policy and practitioner/stakeholder levels and extensive use of social media;

[1] www.vi-mm.eu.

- A clearer, evidence-based view of the impact of Virtual Museums and Digital Cultural Heritage on society and the economy;
- A Manifesto and Roadmap for Action to be validated at the final ViMM international conference in February 2019.

In addition to its core partner consortium, an international Advisory Group of public and private sector experts has been appointed from the outset of ViMM to advise, steer and quality assure its work and to act as a vehicle for continuous communication with many of the major international bodies in the CH field, such as UNESCO, ICOMOS, ICOM, CIPA and Getty in order to maximize the value of international knowledge and work towards global consensus.

From the outset, the ViMM process envisaged, as an important underlying concept and driver of its work, moving from an open, brainstorming approach towards ever greater structuring and granularity of results, based on the achievement of wide consensus. In order to distinguish between key issues and to allow sufficient granularity and clarity of approach, the work of ViMM has been sub-divided into 7 broad Thematic Areas (TA). Each TA is the responsibility of one partner which is an experienced actor on the European scene and which is responsible for bringing together a wide community of interest in their TA. A Support Partner provides complementary expertise and back-up relevant to coordinating the agenda for each TA. All the consortium partners contribute their knowledge of each Area as appropriate. Synergies, linkages and overlaps emerging between the TA undoubtedly exist and are addressed through Action-wide coordination activities. A fuller description of the scope of each TA is available on the ViMM Platform.

The Thematic Areas are: TA1 – Definitions, TA2 – Directions, TA3 – Documentation (which focuses on emerging and future documentation needs such as those in data modelling, semantics and data acquisition and is the key focus of this paper), TA4 – Dimensions, TA5 – Demand, TA6 – Discovery, TA7 – Decisions.

Each of the Thematic Areas established three Working Groups (WG) which acted during the 9 months from March–December 2017 as the key mechanism for obtaining expert input to achieve the project's goals. The method of work was to hold a mixture of 'physical' meetings and remote discussions. The Terms of Reference, proposed outputs, Chairs and members of each Working Group are published on the ViMM Platform. More than 150 identified and invited experts participated in these Working Groups, the end product of which was a set of draft Propositions for each TA.

In April 2018, a consensus-building workshop was organised in Berlin at which over 100 participants, including members selected from the Working Groups together with additional invited experts, discussed and refined the draft Propositions with a view to their adoption or implementation by DCH stakeholders;

The Propositions were then synthesised by the ViMM project team into 10 key areas, leading to the production of a 10-point draft Manifesto, which, at the time of writing this paper is circulated for wide consultation and is receiving extensive feedback from the DCH community, which will be taken into account in producing the final version.

In the next phase, a Roadmap and Action Plan will be developed for the use of the EU, international organisations and the DCH community in developing policies and strategic investments over a 5-year period. This will likewise involve a process of extensive consultation through the ViMM platform, social media and major events, including a final 2-day international conference organised in conjunction with the European Commission in Brussels during February 2019 to seek endorsement and implementation support from the EU, international bodies and other agencies involved in DCH.

2.1 The ViMM Manifesto

Prior to the development of its Roadmap and Action Plan, the findings of ViMM are currently best embodied in its draft Manifesto. We perceive that all 10 points of the Manifesto are relevant for the participants of MTSR in one or another important sense but. We focus here on those items which are especially relevant to its themes, a number of which derive in whole or in part from TA3 -Documentation. The Manifesto is now in the final stages of consultation and subject to final modification.

Giving the Whole Picture: Data, Documentation and Semantics. Over the past two decades, digitisation of Cultural Heritage has happened in a fragmented way, following different standards. Currently, only 15% of cultural heritage resources held by CHI has been digitised and much of that which is, is not freely accessible or suitable for current re-use. The proportion of DCH items in European CHI to which descriptive metadata has been applied is around 50%.

Digitisation should scale using current standards: mass digitisation, also of 3D objects, will provide a strong basis for implementing many of the other points in this Manifesto. As a flagship EU initiative, Europeana should extend its role as the central platform for digital cultural heritage, incrementally increasing the amount and quality of 3D, interactive animations and Extended Reality (XR) content.

Increased awareness and acceptance of the "Digital Turn" and the primary importance of data, especially structured and harmonised data, is central to the future of DCH, given the heterogeneous nature of its data, contents and formats are heterogeneous (3D/2D, textual, audio, video, multilingual). Therefore, quality standards such as the FAIR (Findable, Accessible, Interoperable, and Reusable) data principles need to be prioritized in order to achieve an excellent level of integration, enrichment, retrieval and reuse of content. Standardizing DCH data and metadata will help secure interoperability and interconnection to geo-spatial, bibliographic and archival metadata thus offering a more holistic approach to cultural information, which should be supported by the opening of channels with international standards bodies.

Linked (Open) Data (LOD) performs a critical role in transforming cultural heritage collections. LOD requires semantics – ontologies, standardised controlled vocabularies, thesauri/authority files - and mapping models, and its impact is improved by contextualization of the material. There is a critical need to develop shared LOD frameworks covering the core concepts relevant to cultural heritage: people, organisations, [historical] places, events, etc. Europeana and major cultural heritage institutions can play an important role in developing and promoting such shared frameworks in

collaboration with key research infrastructures such as Digital Research Infrastructure for the Arts and Humanities (DARIAH) European Research Infrastructure for Language Resources and Technology (CLARIN).

Management of cultural information is challenged by issues such as knowledge representation and information integration from different contexts. There is a need to establish and support expert-driven methodologies for managing holistic and user-oriented documentation of DCH in order to increase the scientific, economic and social potential of advanced services to users. Cultural heritage data can be an important and revealing source for big data analytics.

Many, especially older, cultural heritage objects are only partially preserved. The missing parts are then reconstructed while building 3D-objects. For scientific purposes each reconstructed part needs to be not only identifiable, but also holistically documented as to how the reconstruction was conducted and why the part has the actual dimensions, actual colour etc. This holds true especially when elements of intangible heritage are incorporated into virtual reconstructions, such as in Historic Buildings Information Modelling (HBIM) systems. There remains a need to distinguish the 'fictional' and the scientific in virtual models, drawing on principles established in the London and Seville Charters and by ICOMOS.

A vast amount of cultural assets, highly valuable for historical research, are now 'born digital'. Private born-digital archives create held by CHI create a need for further research to define authenticity and for intensive curation, quality standards, policies for long-term preservation, access rights and a code of ethics.

Personal Digital Archives represent the largest stream of born digital cultural content creation globally, through the recording activities of individuals using digital devices and social media. The management and preservation of the vast amount of all the content created by these means represents a daunting and practically impossible task. Despite this, many specific endeavours to archive, curate and make available certain types of cultural content exist, for instance through, family history projects, community photo preservation, oral history, community-based history, thematic crowdsourcing and event archiving. The dissemination of best practices in this important area can play a vital role in diffusing DCH widely and in engaging audience participation.

There is a strong argument for Europeana to extend its role as the central platform for digital cultural heritage incrementally increasing the amount and quality of 3D and XR content and improving access to intangible heritage.

Powering Contextualization. Further momentum is needed to ensure that everyone involved in creating virtual objects provides information to support contextualisation to accompany their products. Standards and methods should be followed if available and other cases addressed to provide sufficient metadata for different contextualisation scenarios.

Many 3D models created in the past have limited applicability due to a lack of associated metadata. This can make it difficult to present cultural heritage objects in the context necessary to understand their meaning and relevance or to draw scientific conclusions from them. DCH projects should emphasise the historical and cultural background of what they are presenting.

Storytelling is an important example of contextualisation. New technologies e.g. 3D and XR offer opportunities to engage, to teach, to involve and are supportive elements for CH storytelling. They will be an important part of digital/virtual exhibitions which transmit both tangible and intangible cultural heritage.

Methods of visualisation based on new technologies need to be exploited. Easy-to-use instruments should be developed to support the integration of new technologies in digital exhibitions and other storytelling applications.

Immersive storytelling through XR playful learning (learning through story, play and interaction) in cultural heritage experiences is an important objective. New areas of creating and representing meaning, in order to provide for personalised experience should be explored along with increased interaction. Presence can be defined as a psychological perception of being Immersed in the XR environment and is essential for engagement and cognitive connection to the content. This involves content which is relevant and coherent in terms of social and cultural factors, including aspects such as cultural values, recognition and significance, representation of emotional intelligence, semantic time, space, provenance and uncertainty and emotion-based user interfaces.

Simulation of 3D worlds should include multilingual interaction with people (including ancient languages) and other actors such as animals, together with integration of sensory aspects such as touch, smell and sound.

Gamification is a feedback loop that incentivises the user to progress in the experience or learning process. Care should be taken to use gamification elements judiciously so as not to overpower the story or learning objective. To sharpen their successful use, gamification techniques should be mapped to the emotional results achieved.

Frameworks and Standards: A Navigable Map. More powerful, intelligent and interconnected standards are required that can be used across domains, creating open formats, based on ontologies, that are interoperable in different systems and disciplines.

Emerging open interoperable frameworks and standards which support, create and share DCH such as the International Image Interoperability Framework (IIIF), Copernicus for Cultural Heritage and others, should be promoted and fast-tracked. However, current standards should be preserved and continuity through backward-compatibility thus sustained.

Standards need to be agreed so that digitised content (tangible and intangible) and the related metadata becomes seamlessly accessible in the long term to all. Metadata may include access to complementary material such as images, books, descriptions and drawings, illustrating the cultural and historic significance of the sites or artefacts.

A framework of ‘virtual values’ is needed to underpin DCH strategies and development, and to provide museum-staff with a comprehensible direction for the museum’s approach to virtual and augmented content. The Virtual Values identified by ViMM include: “Virtual for all” Rule; Layered Content; Accessibility, Sustainability, Complementarity and Digital Privacy.

Driving Organisational Change. Managements of Cultural Heritage institutions should prioritise digital transformation and lead organisational change, cooperating in a shared digitisation process within a common general strategy which tackles interoperability problems, creates "economies of scale", workable frameworks for rights and strengthens the ability of museums to support new technology.

The vision for technology take-up should be mapped to the museum's mission so as not to miss out on opportunities, entailing a regular assessment of organisational 'readiness' for DCH.

In order to improve efficiency and effectiveness of the use of resources, impact assessment studies, based on mature and standardised processes and tools, are needed as a fundamental commitment of CH institutions and as part of projects funded and/or carried out by public and private institutions.

Cultural Heritage Institutions (CHI) are not working in a vacuum and should ensure openness to the outside world. For them to be able to make the most of new technology there needs to be organisational change It is important for museums to develop participatory technology strategies and to invest the needed resources in hardware and software solutions as well as training and support. Accessibility, sustainability and interoperability should be prioritised.

The Human Resources. Innovation in education and training for DCH will enhance awareness of and openness to digital initiatives. Policies should address systematic involvement and training of teachers, curators, administration and governance staff, using methodologies that promote understanding of different media paradigms.

To assure the skills and capacities of the next generation of (digital) curators and (virtual) museologists, the question 'who needs to be trained, for what purpose and at what level' should be directly addressed from a lifelong learning perspective, taking into account secondary, undergraduate, postgraduate, professional and vocational training as well as the engagement of volunteers and the public community in general. Remote and e-learning can play an important role.

Training offers, accompanied by meaningful certification, should be stimulated. These should be addressed to the different target groups involved in Cultural Heritage and their position in the 'digital workflow', broken down into different steps or stages and distinguished between technology skills, curatorial issues and decision or policy making needs. Interdisciplinary approaches are necessary to address all the needs and skills required for DCH.

Anyone involved in handling, exploitation, research and valorisation should be aware of the usefulness of XR technology to support their processes, both internal and external. This should form part of educational curricula in Cultural Heritage. Universities and schools conducting technical education should teach the relevance of cultural background information for the understanding of XR-representations of cultural heritage objects. ViMM supports the recent recommendations of the Council of Europe Strategy 21 in the areas of Knowledge and Education for Cultural Heritage [4] and proposes that the DCH sector recognises and develops them.

3 Holistic Documentation: Widening and Deepening the Approach

Building on the findings of ViMM, DHRLab at CUT has committed its research agenda for the years to come to the development of more holistic approaches to (especially digital) Cultural Heritage documentation. Currently, it sets in train this vital process through three main mechanisms, each of which is described below:

1. The Europeana Task Force on Advanced 3D Documentation
2. The UNESCO Chair on Digital Heritage
3. The European Research Area Chair on Digital Heritage (Horizon 2020).

3.1 The Europeana Task Force Group (TFG) on Advanced Documentation of 3D Digital Assets

The digital documentation of CH assets is inherently a multimedia process, addressed through the digital representation of the shape, appearance and conservation condition of the heritage/cultural object for which 3D digital model is expected to become the representation. 3D representations should progress beyond current levels to provide the necessary semantic information (knowledge/story) for in-depth studies and use by researchers and creative users, offering new perspectives and understandings. Digital surrogates can add a laboratory dimension to on-site explorations originating new avenues in the way tangible cultural heritage is addressed.

The acquisition, processing, archiving and exchange of 3D Cultural Heritage assets and information has been investigated by many projects in Europe; organizations (e.g. Getty, Europeana, the Smithsonian); Scientific Committees (e.g. ICOMOS/CIPA, ICOM/CIDOC and others) and various professionals and experts. At present, many highly elaborated theoretical approaches, principles and guidelines are proposed for data schemes and infrastructures (e.g. London and Seville Charters, CIDOC-CRM, CityGML, Web3D consortium) aiming to foster quality, compatibility and sustainability of 3D Cultural Heritage objects. On the other hand, in practice 3D reconstruction projects are often based on unique and prototypic semantics, workflows, and infrastructures and are customized for a specific purpose (e.g. the CyArk 500 project).

The generation of high-quality 3D models is still very time-consuming and expensive, not least because the modeling is carried out for individual objects rather than for entire collections and formats provided in digital reconstructions are frequently not interoperable and therefore cannot be easily accessed and/or reused or sustained.

Many projects and studies have investigated aspects related to 3D Cultural Heritage assets and highly elaborated theoretical approaches, principles and guidelines are proposed for data schemes and infrastructures. On the other hand, in practice, 3D reconstruction projects are often based on unique and prototypic semantics, workflows, and infrastructures and are customized for a specific purpose. Therefore, after an initial period, the Europeana Task Force Group (TFG), led by Marinos Ioannides, focused on user needs and requirements and on the quality of the 3D data and metadata available in different repositories in Europe and in Europeana itself, thereby providing a more holistic overview of what needs to be done in the area of 3D CH documentation.

In doing so, it paid special attention to qualitative comments on the 3D objects already in Europeana, together with suggestions for the development of standard guidelines and formats, intended for cultural heritage communities.

The multidisciplinary demands of this TFG led us to examine procedures and models on e-documentation of 3D-CH objects. However, the definition, for example, of the term '3D-CH asset' (3D object plus its memory/story) appears increasingly complex. In the field of Documentation of CH there is much misunderstanding and many misconceptions about 'what is a 3D-CH object'. Unfortunately, this also currently applies to the situation visible with the 3D objects available in Europeana. At the same time the classification of what 3D- CH assets are complicated due to the plethora of (frequently unclear) criteria used by specialists. Likewise, users and other stakeholders, together with the data itself, introduce variables that affect the decision-making procedure for e-documentation.

The experts involved in this TFG also have extensive experience in the development of tools and methodologies that engage users actively through the presentation of CH assets. During the first period of this TFG, the experts focused their work on reviewing the results of different EU projects such as CARARE, 3D ICONS, plus the current systems/repositories for 3D CH-3D assets available and a literature review.

In the second period it focused on the following:

(1) Definition and analysis of user and stakeholder needs supported by a survey.
(2) The data and metadata quality of the available 3D content in Europeana.

Following several online discussions among the TFG members, a questionnaire was developed using Google-forms. The online survey was tested by several local stakeholders in three EU countries (Cyprus, Greece and Slovenia) and then distributed to 3,500 professionals with a total of 937 survey responses. The foci included digitisation methods, metadata extraction, post-processing, modelling, harvesting, the quality of the Europeana Data Model (EDM) information and the accuracy of 3D objects (including Intangible Heritage), also covering semantically-aware 3D objects with a view to improving their archiving, retrieval, reusability and sustainability, enriching the geometrical structure(s) with related knowledge and considering the range of devices, models and software applications involved and the ongoing revolution in technology.

The following 3D objects from Europeana have been taken into consideration in the survey. This selection of objects available in Europeana give us a good overview of the current situation so far as digitisation technologies are concerned: their metadata quality, the geometrical accuracy of the 3D data, and the possibility of wide use and re-use of the data.

1. A model of Etruscan Oinochoe with small wheel-shaped handle[2]:
2. A model of statue of heroic Claudio[3]
3. Coronation medallion[4]

[2] https://www.europeana.eu/portal/en/record/2048703/object_HA_690.html.
[3] https://www.europeana.eu/portal/en/record/2048703/object_HA_1799.html.
[4] https://goo.gl/gNn1a5.

Table 1. Respondent's level of studies.

Level of education	% of users
a) BSc	10
b) MSc	28
c) PhD	59
d) None of the above	3

Table 2. Categorisation of users by occupation - summary

Archaeologists	13%
Engineers (all types)	12%
Architects	11.19%
Historians	9.03%
ICT specialists	7.53%
Teachers/Trainers	7.53%
Archivists/librarians/museologists	4.64%
All others	32%

4. Nuage de points de l'église de Fontains[5]
5. Saint Salvator abbey of Ename around 1595 (high res 3D)[6]

Survey Analysis. The full report of the TFG [3] is available from Europeana and provides illustrated examples of survey outcomes for each of the selected objects [1]. Taking the example was the 3D model of Coronation medallion and 37.12% were satisfied or very satisfied, 35.61% were neutral, 27.28% were adequately or not satisfied overall. In general, current satisfaction levels with 3D on Europeana at present were modest (Tables 1 and 2).

Results and Future Work. It was possible during this TFG period to provide some information on the quality of metadata and the accuracy of the corresponding 3D data. As a further step, we defined the possible group of users and their requirements and needs.

These findings have been presented to Europeana and an application is being considered to extend the work of the TFG for a second period so that new guidelines and effective methods for the processing, archiving and long-term preservation of 3D cultural heritage assets can be developed and proposed. It is proposed that this work will also promote interoperable standard formats for semantically-aware 3D modelling, analysis and representation of cultural heritage to allow easy retrieval, distribution, publishing and reuse of such models, which in turn will help ensure sustainable cross-sector collaborative work in future in both development and research. This will involve

[5] https://goo.gl/4GciUu.

[6] https://www.europeana.eu/portal/en/record/2048716/object_HA_2087.html?q=Enam.

suggestions for a possible modification of the EDM and improvement of the current 3D-CH assets in Europeana.

An additional outcome of the proposed second Task Force would be to gain further insight into daily practices, innovative approaches, and theoretical aspects to determine a scope of topics for further investigation.

4 Next Steps

4.1 UNESCO Chair in Digital Heritage

Dr Marinos Ioannides, Director of DHRLab, Cyprus University of Technology (CUT), was awarded the UNESCO Chair in Digital Heritage in October 2017. This UNESCO Chair will serve as a prime means of capacity building through the exchange of knowledge and sharing within the construction of the Chair's partnership, in which institutions in developing countries and countries in transition in Europe, the Balkans, Middle East and Africa join forces with developed countries. Among its wide ranging and global portfolio of activities are to:

- Introduce model Digital Heritage curricula ('cultural informatics') at vocational, undergraduate and postgraduate levels and extend course availability, teaching and study facilities to students from at least 10 countries, including 6 Developing Countries.
- Define, extend and carry out a program of research in digital heritage designed to further UNESCO's cultural heritage agenda in the region and to impact its key objectives.

4.2 ERA Chair in Digital Heritage- Mnemosyne

Cultural Heritage is a strategic resource for Europe with high cultural, social, environmental and economic value. The era of Digital Cultural Heritage (DCH) is now well underway and the European research resource for DCH has grown significantly in recent years. But the visible contribution of the Widening countries to this effort remains relatively weak. The DHRLab has been an exception in this respect, becoming a beacon in the Eastern Mediterranean and for Europe in general, in particular through its leadership of key initiatives in DCH research training[7] and in policy co-ordination and support.

The **Mnemosyne** Coordination and Support Action funded under Horizon 2020 WIDESPREAD-03-2017 - ERA Chairs, begins in January 2019. This new ERA Chair in Digital Heritage is an ideal opportunity to ensure that DHRLab strengthens its research capacity and restructures its role, by means of a well-designed and iterative process. Mnemosyne will proceed from the appointment of an outstanding researcher and research manager as ERA Chair holder in 2018 who will attract, direct and maintain high quality human resources and negotiate and implement the necessary

[7] https://itn-dch.net/.

structural changes to achieve excellence on a sustainable basis. The project will be carried out over a period of 5 years. Following recruitment of the ERA Chair research team, a three-phase research programme centred on holistic documentation of the DCH lifecycle in support of existing and potential user needs will be carried out and extensively evaluated, with strong attention paid to exploitation.

5 Conclusion

The work carried out by the ViMM Coordination and Support Action, carries the potential to be highly influential in supporting development of EU and international strategies for Digital Cultural Heritage in general, documentation and metadata in particular. By pointing the way to a broader concept of the role of documentation in presenting digital heritage in such a way that it tells more of the 'story' and establishes more compelling contexts in order to engage and extend knowledge to a wider audience, the prospects for DCH to play a central role in social and economic development will be significantly enhanced. The future work of the Mnemosyne UNESCO and ERA Chairs over the coming years are planned to enhance the achievement of this goal, alongside efforts to contribute to the development of Europeana as an instrument of knowledge and learning.

References

1. Carr, A., Nicolaïdès, A. (eds.): Asinou across time: studies in the architecture and murals of the Panagia Phorbiotissa, Cyprus (Dumbarton Oaks Studies 43). Dumbarton Oaks Research Library and Collection, Washington DC (2013)
2. Hayes, J., Quimet, C., Santana Quintero, M., Fai, S., Smith, L. (eds.): Digital heritage. progress in cultural heritage: documentation, preservation, and protection ICOMOS/ISPRS International Scientific Committee on Heritage Documentation (CIPA)
3. Hirst, C.S., et al.: Standardisation in 3D geometric morphometrics: ethics, ownership and methods. Archaeologies: Journal of the World Archaeological Congress (2018). https://doi.org/10.1007/s11759-018-9349-7
4. Ioannides, M., Davies, R. (eds.): Final report on advanced documentation of 3D digital assets (Europeana Task Force Group), February 2018
5. Ioannides, M., et al. (eds.): 6th International Conference, EuroMed 2016, Nicosia, Cyprus, October 31 – November 5, 2016, Proceedings, Part I & Part II (2016)
6. Ioannides, M., et al.: 3D digital libraries and their contribution in the documentation of the past. In: Ioannides, M., Magnenat-Thalmann, N., Papagiannakis, G. (eds.) Mixed reality and gamification for cultural heritage. Springer, Cham (2017). https://doi.org/10.1007/978-3-319-49607-8_6
7. Mathys, A, Lemaitre, S., Brecko, J., Semal, P.: Agora 3D: evaluating 3D imaging technology for the research, conservation and display of museum collections. Antiquity **87**(336) (2013)

8. Niven, K., Richards, J. (eds.): The storage and long-term preservation of 3D data. Academic Press, London (2017)
9. Pajas, J.A., Olivam, A.S.: Assessment, dissemination and standardization of geometric data recording of archaeological heritage obtained from 3D laser scanning. Virtual respect **4**, 187–193 (2009)
10. 26th International CIPA Symposium – Digital workflows for heritage conservation (Volume IV-2/W2) 28 August–1 September 2017, Ottawa, Canada