

# RISE IMET 2021

2 - 4 June, Nicosia, Cyprus

Emerging Technologies and  
the Digital Transformation of  
Museums and Heritage Sites



BOOK OF ABSTRACTS

# **RISE IMET International Conference on Emerging Technologies and the Digital Transformation of Museums and Heritage Sites**

**A Virtual Conference  
June 2-4th 2021**

**Organiser**



**Proceedings Published by**



**Edited by: Theopisti Stylianou-Lambert and Maria Shehade  
(RISE IMET Chairs)**

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## TABLE OF CONTENTS

About CYENS .....	4
Message from the Research Director.....	5
Message from the Chairs of RISE IMET 2021 .....	6
RISE IMET 2021 Committees .....	8
Conference Chairs.....	10
RISE IMET 2021 Full Detailed Program .....	11
Day 1.....	17
Keynote Speech: Computational museology: ‘whole of environment’ encoding .....	19
Participatory Approaches, Crowdsourcing and New Technologies.....	21
Emerging Technologies and Visitor Engagement in Museums and Heritage Sites .....	25
Keynote Speech: The collection is dead; long live the collective.....	30
Digital Storytelling for Cultural Heritage Interpretation .....	33
Mobile Applications and Gamification for Cultural Heritage .....	38
Day 2.....	42
Keynote Speech: Being Ethical in Digital Cultural Heritage Practice .....	44
Galleries, New Technologies and Art.....	46
Digital Curation and Immersion in Museums.....	52
Keynote Speech: Realistic Humans in Virtual Cultural Heritage .....	56
Mixed Reality in Museums and Heritage Sites.....	58
Emerging Technologies, Difficult Heritage and Affective Practices.....	63
Day 3.....	67
Keynote Speech: Mixing visual media for Cultural Heritage .....	69
Explorations on Digital Ethics, Inclusiveness and Authenticity .....	71
Digital Heritage and Virtual Museums: New Approaches and Challenges.....	75
Digitization, Documentation and Digital Representation of Cultural Heritage.....	80
Workshop .....	84

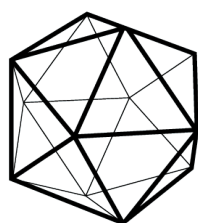
## About CYENS

CYENS Centre of Excellence (formerly known as RISE) specialises in interactive media, smart systems and emerging technologies. CYENS constitutes a joint venture between the three public universities of Cyprus - University of Cyprus (UCY), Cyprus University of Technology (CUT), and Open University of Cyprus (OUC), the Municipality of Nicosia and two renowned international partners, the Max Planck Institute for Informatics (MPI), Germany, and the University College London (UCL), United Kingdom.

The Centre was established through the support of the European Union's Horizon 2020 Research and Innovation Programme (H2020 – WIDESPREAD –2016-2017 – Teaming Phase 2) under grant agreement No. 739578, the Cyprus Government through the Directorate General for European Programmes, Coordination and Development, the European Structural and Investment Funds, and multiple other sources.

The key purpose of CYENS is to attain excellence in scientific research and inspire disruptive innovation and creativity by bringing a critical mass of researchers, scientists and entrepreneurs close together with enterprises, local authorities and other stakeholders. Ensuring direct and connected impact of research outputs on innovation and commercialisation, ultimately it helps to forge an extroverted innovation-driven economy in Cyprus and the Region.

Thus, the vision of the Centre is twofold: support the social, cultural and economic development of the island through scientific excellence, multi-disciplinary collaboration, innovation and entrepreneurship and, ultimately, establish itself as an internationally renowned Research Centre of Excellence in its field.



**CYENS**  
CENTRE OF EXCELLENCE



## **Message from the Research Director**

CYENS is positioned on the crossroads of industry, government, and academia. Thus, the Centre is able to operate according to the most current developments in related areas and can react to enhance the employability of the national workforce and its skill set. CYENS's national skills programs combine immersive technologies and impactful training delivery methodologies and focus on solving real world problems. Being among the market leaders and innovators in the technology sector, we foresee a significant role in enabling and contributing to the digital economy, spearheading innovations for our partners and clients in strategic sectors such as transportation, energy, aviation, healthcare, e-government and cultural heritage.

Striving for high quality, efficiency and responsiveness in today's rapidly changing economic and technological developments, CYENS Centre of Excellence has taken up the challenge of not only producing high quality research and providing high quality professional training to its researchers, but also facilitating technology transfer expertise and resources currently to companies.

Research at CYENS takes into consideration the central role of humans within technology development, deployment and adoption, along with the societal challenges and the impact of technology innovation. CYENS formed its first 10 research teams (Multidisciplinary Research Groups, MRGs) in the summer of 2018. These teams are led by established academics from all three public universities in Cyprus, forming the backbone of CYENS, while 7 new teams, recruited more recently, are led by researchers fully employed by the Centre. The diverse yet complementary expertise of our research teams spans the whole spectrum of scientific areas needed for holistic multidisciplinary approach to interactive media, smart systems and emerging technologies.

Through the RISE IMET 2021 conference, CYENS aims to introduce series of CYENS annual conferences focusing on Interactive Media, Smart Systems and Emerging Technologies (IMET). This year, the conference is dedicated to Emerging Technologies and the Digital Transformation of Museums and Heritage Sites, which is one of the areas of research within the Centre. A number of CYENS groups currently engage with cultural heritage and technology: the Museum Lab, ITICA, CCAPPS, BIO\_SCENT, V-EUPNEA and others. Furthermore, we are currently collaborating with museums and heritage organisations in Cyprus to develop virtual exhibitions, a variety of applications for museums such as VR and AR as well as 3D reconstructions.

Finally, I would like to thank the Museum Lab, which took the lead in organizing this conference, and to wish everyone an engaging and rewarding conference.

**Dr Yiorgos Chrysanthou**

**Research Director**

**CYENS Centre of Excellence**

## Message from the Chairs of RISE IMET 2021

The RISE IMET International Conference on Emerging Technologies and the Digital Transformation of Museums and Heritage Sites is held online on June 2-4th 2021. Although the conference was originally planned to take place in June 2020, the COVID-19 pandemic outbreak and the problems created led to the postponement of the conference for 2021. The conference is organized by the CYENS Centre of Excellence and it is the first conference in a series of CYENS conferences focusing on Interactive Media, Smart Systems and Emerging Technologies (IMET).

The first RISE IMET conference is dedicated to Emerging Technologies and the Digital Transformation of Museums and Heritage Sites. In particular, the conference is dedicated to the exploration of current practices in the use of emerging and interactive technologies such as augmented, mixed or virtual reality, holographic models, 3D models, artificial intelligence, sensors and gamification in museums and heritage sites. The aim of this conference is to promote critical and interdisciplinary approaches and conversations between participants from diverse fields and to encourage interdisciplinary dialogue between academics and professionals from various backgrounds on digital advances, innovation and their impact on the field of cultural heritage. Thus, the conference is addressed to academics and professionals from the fields of museum studies, cultural heritage, computer science, heritage management, artificial intelligence, visual arts and cognitive science amongst others, and aims to provide an interdisciplinary platform to discuss state-of-the-art developments in the academia and industry as well as to provide opportunities for networking and collaboration through a series of keynote addresses and presentations.

The conference offers a variety of themes, focusing on many different types of technologies, as well as on different key discussions, such as: advantages, challenges and limitations of emerging technologies, current theoretical and practical approaches in digital heritage, emerging trends in the digital presentation, interpretation and management of cultural heritage, issues of immersion and authenticity, as well as the application of emerging technologies in specialized areas of cultural heritage (e.g. contested heritage, cultural tourism, education and museum pedagogy, participatory practices etc). Through these themes, the conference covers many aspects of different applications of emerging technologies in museums and heritage sites, offering insights to both the technical aspect and challenges faced and to the interpretive aspect of the museum experience, as well as on the visitor/user experience. The presentations also discuss a variety of different technologies such as VR, AR, MR, gamification, virtual humans (avatars), projections and holograms, 3D scanning and photogrammetry, digital archival practices and digitization tools amongst others.

A total of 119 submissions were received from more than 27 countries, including the USA, the UK, the Philippines, Estonia, Austria, Greece, France, Australia, Cyprus, Spain, Norway, Finland, the Netherlands, China, Sweden, Germany, Argentina, Israel, Russia, Mexico and Italy amongst others. The selected participants come from universities, research centres, museums and heritage organizations, showcasing case studies and collaborative research amongst various actors and countries, presenting different approaches and challenges found in different parts of the world. The presentations are also indicative of the interdisciplinary nature of the conference, since many author groups consist of a mixture of collaborating scientists coming from the fields of technology or

computer science, museums and heritage, digital humanities, showcasing interdisciplinary endeavors and research, which was the main aim of the RISE IMET conference.

The RISE IMET 2021 offers a virtual platform for its participants to share their experiences, knowledge, insights and exchange ideas on the future of emerging technologies in museums and heritage sites. The conference also includes five keynote speeches from distinguished academics and professionals: Professor Alan Chalmers (WMG, University of Warwick), Professor Sarah Kenderdine (Laboratory for Experimental Museology, eM+, École Polytechnique Fédérale de Lausanne EPFL), Dr Jenny Kidd (Cardiff University), Dr Nancy Proctor (Director, The Peale Center for Baltimore History and Architecture) and Dr Roberto Scopigno (Director, ISTI-CNR, Italy). We would like to extend our gratitude to our keynote speakers for their contribution in the conference. We are also extremely grateful to our Scientific Committee for the valuable reviews and the time they invested in producing high quality reviews and ensuring the high academic standard of all accepted papers. Their expertise and support constituted a bedrock for the success of this conference. We would also like to thank Springer for supporting us in the production of the conference proceedings and for providing us with the opportunity to publish the RISE IMET proceedings in their CCIS series.

Last but not least, we would like to take this opportunity to thank all conference participants for supporting and trusting RISE IMET, especially through the organizational difficulties faced because of the COVID-19 pandemic outbreak. Their high-quality contributions allowed RISE IMET to achieve the academic and public outreach goals set at the beginning of this journey.

#### **RISE IMET 2021 Chairs**

**Dr Theopisti Stylianou-Lambert, Cyprus University of Technology / CYENS Centre of Excellence**

**Dr Maria Shehade, CYENS Centre of Excellence**

## RISE IMET 2021 Committees

### General Chairs

Theopisti Stylianou-Lambert	Cyprus University of Technology/ CYENS Centre of Excellence, Cyprus
Maria Shehade	CYENS Centre of Excellence, Cyprus

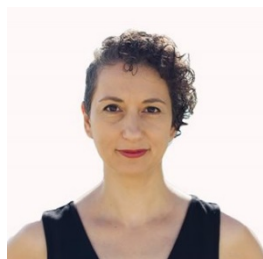
### Scientific Committee

Georgios Artopoulos	The Cyprus Institute, Cyprus
Kostas Arvanitis	University of Manchester, UK
Nikolas Bakirtzis	The Cyprus Institute, Cyprus
Gareth Beale	University of Glasgow, UK
Agiafis Benardou	ATHENA Research Centre, Greece
Antonis Bikakis	University College London, UK
Chiara Bonacchi	University of Stirling, UK
Alexandra Bounia	University of the Aegean, Greece
Katherine Burton Jones	Harvard University Extension School, USA
Fiona Cameron	Western Sydney University, Australia
George Caridakis	University of the Aegean, Greece
Despina Catapoti	University of the Aegean, Greece
Alan Chalmers	University of Warwick, United Kingdom
Panagiotis Charalambous	CYENS Centre of Excellence, Cyprus
Angeliki Chrysanthi	University of the Aegean, Greece
Yiorgos Chrysanthou	University of Cyprus/CYENS Centre of Excellence, Cyprus
Loraine Clarke	University of St Andrews, UK
Costis Dallas	University of Toronto, Canada
Areti Damala	CNRS and Ecole Normale Supérieure, France
Daniela De Angeli	University of Bath, UK
Kirsten Drotner	University of Southern Denmark
Maria Economou	University of Glasgow, UK
Haitham Eid	Southern University at New Orleans, USA
Anna Foka	Uppsala University, Sweden
Bernard Frischer	Indiana University, USA
Andreas Georgopoulos	National Technical University of Athens (NTUA), Greece
Antigone Heraclidou	CYENS Centre of Excellence, Cyprus
Lily Hibberd	Université de Paris, France / EPFL Switzerland
Eva Hornecker	Bauhaus-Universität Weimar, Germany
Marinos Ioannides	Cyprus University of Technology, Cyprus
Martin Kappel	Technische Universität Wien, Austria
Jenny Kidd	Cardiff University, UK
Volker Kuchelmeiste	University of New South Wales (UNSW Sydney), Australia
Tsvi Kuflik	The University of Haifa, Israel
Andreas Lanitis	Cyprus University of Technology/ CYENS Centre of Excellence, Cyprus
Annette Loeseke	New York University, Berlin Campus, Germany
Paul Marty	Florida State University, USA
Franco Niccolucci	University of Florence Italy
George Papagiannakis	University of Crete / FORTH Institute, Greece
Seamus Ross	University of Toronto, Canada
Maria Roussou	National and Kapodistrian University of Athens, Greece
Apostolos Sarris	University of Cyprus, Cyprus
Maria Shehade	CYENS Centre of Excellence, Cyprus
Colin Sterling	University of Amsterdam, the Netherlands
Theopisti Stylianou-Lambert	Cyprus University of Technology/ CYENS Centre of Excellence, Cyprus

Elena Stylianou	European University Cyprus, Cyprus
Stella Sylaiou	Hellenic Open University, Greece
Hannah Turner	University of British Columbia, Canada
Giasemi Vavoula	University of Leicester, UK
Elena Villaespesa	Pratt Institute, USA
Sharon Webb	University of Sussex, UK
Tim Weyrich	University College London, UK
Andrea Witcomb	Deakin University, Australia

## CONFERENCE CHAIRS

**Dr Theopisti Stylianou-Lambert, Associate Professor, Cyprus University of Technology/ Museum Lab MRG Leader, CYENS Centre of Excellence**



Theopisti Stylianou-Lambert is associate professor at the Department of Multimedia and Graphic Arts of the Cyprus University of Technology (CUT). She is leader of the “Museum Lab” group at CYENS Center of Excellence and the coordinator of “Visual Sociology and Museum Studies Lab” of CUT. Her research interests include museum studies, visual sociology with an emphasis on photography, and new technologies in museums. Theopisti has published widely on museums and photography, is the co-editor of “Emerging Technologies and Museums: Mediating Difficult Heritage” (Berghahn Books, forthcoming 2022), co-author of *The Political Museum* (Routledge, 2016) and the editor of *Museums and Visitor Photography* (MuseumsEtc, 2016), *Museums and Photography: Displaying Death* (co-editor, Routledge, 2017), and *Photography and Cyprus: Time, Place, Identity* (co-editor, I.B.Tauris, 2014). She received her PhD in Museum Studies from the University of Leicester (UK), is the recipient of several scholarships and awards including a Smithsonian Fellowship in Museum Practice (USA), a Fulbright Fellowship (USA) and an Arts and Humanities Research Council Award (UK).

**Dr Maria Shehade, Research Associate, CYENS Centre of Excellence**



Maria Shehade is a Research Associate at the Museum Lab of the CYENS Centre of Excellence and an Expert Scientist (Adjunct Lecturer) at the Cyprus University of Technology. She obtained her PhD title in Cultural Heritage Management from the Institute for Sustainable Heritage of UCL. She also holds a Master's degree in Cultural Heritage Management from the Institute of Archaeology of UCL, a Bachelor degree in History, Archaeology and History of Art from the National and Kapodistrian University of Athens and a Certificate in Negotiation from the Institute of Leadership and Management, UK. She has worked as a Research Associate in a number of research projects in the UK, Greece and Cyprus offering her expertise in heritage management, museology and history and archaeology. She has also taught courses in several Universities including University College London, the University of Nicosia, Open University Cyprus and the Cyprus University of Technology. She has received several scholarships and awards for her research from the National Foundation of Scholarships of Greece, the UCL Graduate School and the Leventis Scholarship Foundation, which also funded her doctoral research.

**All times are displayed in Central European Summer Time (CEST)**

## Wednesday, 02 Jun

10:00 - 10:30	<b>Opening / Welcome</b> Opening: Yiorgos Chrysanthou, Research Director, CYENS Welcome: Theopisti Stylianou-Lambert and Maria Shehade, RISE IMET Chairs
10:30 - 11:30	<b>Keynote Speech: Computational museology: 'whole of environment' encoding</b> Sarah Kenderdine Laboratory for Experimental Museology (eM+), École Polytechnique Fédérale de Lausanne (EPFL)
11:30 - 12:00	Break
12:00 - 13:30	<b>Participatory Approaches, Crowdsourcing and New Technologies</b> Chair: Angeliki Chrysanthi, University of the Aegean
12:00	Participation in cultural heritage hackathons: 'carsharing' between 'meaningful nonsense' and 'unromantic' networking Franziska Mucha, University of Glasgow
12:15	The shaping of memory and identity through digitised photographs of institutional repositories Myrto Theocharidou, Cyprus University of Technology
12:30	The Fragility of Museum Social Media Practices Cassandra Kist, University of Glasgow
12:45	Storybase: towards Cultural Transformation Driven by Design Violeta Tsenova, Newcastle University
13:00	Q & A
12:00 - 13:30	<b>Emerging Technologies and Visitor Engagement in Museums and Heritage Sites</b> Chair: Giorgos Papaioannou, Ionian University
12:00	On digital interactions and visitor engagement Giasemi Vavoula, University of Leicester
12:15	Trails of Walking- Ways of Talking: The Museum Experience Through Social Meaning Mapping Dimitra Christidou, Norwegian University of Science and Technology Luise Reitstätter, University of Vienna
12:30	Adoption and Impact of Digital Ecomuseum in Cities: Insights from the Pros-Eleusis evaluation activities Yannis Pappas, Mentor in Culture & Heritage Leonidas Argyros, Mentor in Culture & Heritage Despoina Tsiafaki, Institute of Language and Speech Processing Maria Boile, "ATHENA" Research and Innovation Center Panagiotis Gkiokas, Mentor in Culture & Heritage Natasa Michailidou, "ATHENA" Research and Innovation Center Vassilis Kourtis, "ATHENA" Research and Innovation Center Akrivi Katifori, "ATHENA" Research and Innovation Center
12:45	Why is this exhibit digital? – dimensions of digital exhibits in the museum space Pille Runnel, Estonian National Museum Pille Pruulmann-Vengerfeldt, Malmö University Krista Lepik, University of Tartu
13:00	Q & A
13:30 - 14:30	Lunch Break

14:30 - 15:30	<b>Keynote Speech: The collection is dead; long live the collective</b>  Nancy Proctor Director, The Peale Center for Baltimore History and Architecture
15:30 - 16:00	Break
16:00 - 17:30	<b>Digital Storytelling for Cultural Heritage Interpretation</b> Chair: Katherine Burton Jones, Harvard University Extension School
16:00	Place-based Digital Storytelling. The interplay between narrative forms and the cultural heritage space Angeliki Chrysanthi, University of the Aegean Akrivi Katifori, National and Kapodistrian University of Athens Maria Vayanou, National and Kapodistrian University of Athens Angeliki Antoniou, University of West Attica
16:15	REVAthens: Bringing Athens of the Revolution to life through museum theatre methodology and digital gamification techniques. Yannis Stoyannidis, University of West Attica Andromache Gazi, Panteion University of Social and Political Sciences Ilias Marmaras, Personal Cinema Greece Foteini Venieri, Panteion University of Social and Political Sciences Thodoris Giannakis Yannis Scoulidas, Personal Cinema Greece Stewart Ziff, Personal Cinema Greece
16:30	Bridging Past and Present: A Case Study of Creating and Deploying a Historical Character to Engage Audiences through AR and VR Juilee Decker, Rochester Institute of Technology Amanda Doherty, Rochester Institute of Technology Joe Geigel, Rochester Institute of Technology Gary Jacobs, Rochester Institute of Technology
16:45	The (too) Reliable Narrator. Studying the impact of AI on visitors' narratives Valentina Vavassori, King's College London
17:00	Q & A
16:00 - 17:15	<b>Mobile Applications and Gamification for Cultural Heritage</b> Chair: Panagiotis Charalambous, CYENS Centre of Excellence
16:00	Interdisciplinary design of an educational applications development platform in a 3D environment focused on cultural heritage tourism Konstantinos Kotsopoulos, University of Patras Julia-Anna Sharamyeva, University of Athens Stavros Vlizon, Ionian University
16:15	Que.St: game design strategies as a tool for promoting cultural heritage of Saint - Petersburg Lada Maksimova, ITMO University Antonina Puchkovskaya, ITMO University
16:30	Emerging technologies for learning at a cultural heritage site: The design of the CompARE mixed reality gamified learning environment Eleni Kyza, Cyprus University of Technology Markos Souropetis, Cyprus University of Technology
16:45	Q & A



## Thursday, 03 Jun

10:30 - 11:30	<b>Keynote Speech: Being Ethical in Digital Cultural Heritage Practice</b> Jenny Kidd, School of Journalism, Media and Culture, Cardiff University
11:30 - 12:00	Break
12:00 - 13:30	<b>Galleries, New Technologies and Art</b> Chair: Alexandra Bounia, University of the Aegean
12:00	Curating networked objects: the mediation of contemporary art digitizations online Stephanie Bertrand, Aristotle University of Thessaloniki
12:15	Virtual Art Viewing for Education and Learning (VAVEL): A tool for automatic Virtual Art Space creation for students and artists Joshua Siegel, Michigan State University Vicky Karaïskou, Open University of Cyprus Georgios Pappas, Open University of Cyprus and Michigan State University
12:30	Artwork Recognition Using Wearable Cameras: Methodologies, Challenges and Potential Uses Zenonas Theodosiou, CYENS Centre of Excellence Harris Partaourides, CYENS Centre of Excellence Andreas Lanitis, Cyprus University of Technology / CYENS Centre of Excellence
12:45	Emerging technologies beyond museums Vicki Triantafylloudi, Hyperco SA and Erasmus University Rotterdam Trilce Navarrete Hernandez, Erasmus University Rotterdam
13:00	Q & A
12:00 - 13:30	<b>Digital Curation and Immersion in Museums</b> Chair: Maria Shehade, CYENS Centre of Excellence
12:00	An Ontological Model for Digital Curation: Materiality, Aura & Virtuality Stella Sofokleous, National and Kapodistrian University of Athens
12:15	Mapping sonic practices in museum exhibitions – An overview Foteini Salmouka, Panteion University of Social and Political Studies Andromache Gazi, Panteion University of Social and Political Studies
12:30	Generating "cultural heritage": multimedia displays and immersive experience in the early 20th and 21st centuries. Berlin's Pergamon Museum and Panorama exhibition Annette Loeseke, New York University Berlin
12:45	Evaluation and Impact Assessment of Emerging Technologies for Museums and Heritage Institutions: Institutional and Organisational Learning Areti Damala, Centre national de la recherche scientifique (CNRS) Merel van der Vaart, WAAG Dick van Dijk, WAAG Pam de Sterke, WAAG
13:00	Q & A
13:30 - 14:30	Lunch Break
14:30 - 15:30	<b>Keynote Speech: Realistic Humans in Virtual Cultural Heritage</b> Alan Chalmers WMG, University of Warwick
15:30 - 16:00	Break

**16:00 - 17:30 Mixed Reality in Museums and Heritage Sites**

Chair: Paul Marty, Florida State University

- 16:00 Cultural Heritage Documentation: the case study of the Ottoman Bath in Apollonia, Greece  
 Stella Sylaiou, Aristotle University of Thessaloniki  
 Paschalīs Androudis, Aristotle University of Thessaloniki  
 Maria Tsiapali, Ephorate of Antiquities of Thessaloniki City  
 Nikos Trivizadakis, Ephorate of Antiquities of Thessaloniki City  
 Dimitrios Ramnalis, GEOSENSE IKE  
 Vassilios Polychronos, GEOSENSE IKE  
 Vassilios Efopoulos, TESSERA S.A  
 Konstantinos Evangelidis, International Hellenic University
- 16:15 Visiting a Virtual Acropolis on the Immersive Web  
 Gunnar Liestol, University of Oslo  
 Jay Bolter, Georgia Institute of Technology  
 Maria Engberg, Malmö university  
 Colin Freeman, Georgia Institute of Technology  
 Blair MacIntyre, Georgia Institute of Technology
- 16:30 Augmented Reality for urban cultural heritage experiences: Lessons of a partly failed application.  
 Maria Engberg, Malmö university
- 16:45 XR checklist - what to consider when extending heritage  
 Roberta Bertini Viégas, Reinwardt Academy / Netherlands Institute for Sound and Vision
- 17:00 Q & A

**16:00 - 17:30 Emerging Technologies, Difficult Heritage and Affective Practices**

Chair: Hannah Turner, University of British Columbia

- 16:00 Emerging Technologies and the Advent of the Holocaust "Hologram"  
 Cayo Gamber, The George Washington University
- 16:15 The Atlas of Lost Rooms: Digitally Reconstructing Dark Heritage Sites in Ireland  
 Chris Hamill, Queen's University Belfast
- 16:30 Tangible and Embodied Interaction for Scaffolding Difficult Heritage Narratives  
 Areti Damala, Centre national de la recherche scientifique (CNRS)
- 16:45 Dimensions in Testimony: Affect, Holograms and New Curatorial Challenges  
 Elena Stylianou, European University Cyprus
- 17:00 Q & A

## Friday, 04 Jun

10:30 - 11:30	<b>Keynote Speech: Mixing visual media for Cultural Heritage</b> Roberto Scopigno Director, ISTI-CNR, Pisa, Italy
11:30 - 12:00	Break
12:00 - 13:30	<b>Explorations on Digital Ethics, Inclusiveness and Authenticity</b> Chair: Antigone Heraclidou, CYENS Centre of Excellence
12:00	Interactions for everybody!? On creating inclusive technologies and the generative potential of disability Nicole Schimkus, University of Potsdam
12:15	Towards museum digital ethics: introducing, addressing, defining and measuring the Museum Digital Atmosphere Sofia Paschou, Ionian University Georgios Papaioannou, Ionian University
12:30	Ethical Considerations and Methods for Diversifying Representations of Cultural Heritage: A Case Example of the Swayambhu UNESCO World Heritage Site in Nepal Bhikshuni Lozang Trinlae, University of Tartu
12:45	Development of Design Protocols in the Use of Virtual Reality for Cultural Heritage Representation Gamaliel Domingo, De La Salle University Manila
13:00	Q & A
12:00 - 13:30	<b>Digital Heritage and Virtual Museums: New Approaches and Challenges</b> Chair: Doros Polydorou, Cyprus University of Technology
12:00	Fusing Virtual Reality, Robots and Social Networking Technologies to Build the Virtual Museum of the Future: Towards a New Type of Community Based Cyber-Physical-Social Eco-System. Lyuba Alboul, Sheffield Hallam University Louis Nisiotis, UCLan University Cyprus Martin Beer, Sheffield Hallam University
12:15	Virtual Dance Museums: the case of Cypriot folk dancing Andreas Aristidou, University of Cyprus Anastasiou Yiannakidis, University of Cyprus Yiorgos Chrysanthou, University of Cyprus
12:30	An exploration on the quality of Cultural Heritage Communication in Digital Environments Srushti Goud, University of Turin Vincenzo Lombardo, University of Turin
12:45	Machine Learning and Museum Collections: A Data Conundrum Lukas Noehrer, The University of Manchester Jonathan Carlton, The University of Manchester Caroline Jay, The University of Manchester
13:00	Q & A
13:30 - 14:30	Lunch Break
14:30 - 15:45	<b>Digitization, Documentation and Digital Representation of Cultural Heritage</b> Chair: Andreas Lanitis, CYENS Centre of Excellence
14:30	Pioneering advanced recording technologies for post-earthquake-damage assessment and re-construction in Chilean heritage areas Bernadette Devilat, Nottingham Trent University

14:45	Formalization of the "Immaterial Features" Conveyed by the Iconographic Cultural Heritage Entities Gian Piero Zarri, Sorbonne University
15:00	On the new application of the photogrammetric method for the task of digitizing an object wave of a display full-color hologram Anastasia Timoshenkova, Saint-Petersburg State University of Culture and Arts Nikolay Balbekin, ITMO University Tatyana Shlykova, Saint-Petersburg State University of Culture and Arts, Nickolay Petrov, ITMO University Ekaterina Rabosh, ITMO University
15:15	Q & A
14:30 - 16:00	<b>Workshop</b>
14:30	Revisiting what is on offer: nourishing blended inquiry learning in the galleries and beyond Stamatina Anastopoulou, University of Leicester Giasemi Vavoula, University of Leicester Torhild Skåtun, Norwegian Museum of Science and Technology
16:00 - 16:30	Break
16:30 - 17:00	<b>Closing Remarks</b> Chair: Theopisti Stylianou-Lambert, Cyprus University of Technology / CYENS Centre of Excellence Participants: Alan Chalmers, WMG, University of Warwick Sarah Kenderdine, Laboratory for Experimental Museology (eM+), École Polytechnique Fédérale de Lausanne (EPFL) Nancy Proctor, Director, The Peale Center for Baltimore History and Architecture Roberto Scopigno, Director, ISTI-CNR, Pisa, Italy

Wednesday, 02 June

## Oral Presentations

- 10:00- 10:30 Opening/ Welcome
- 10:30 - 11:30 Keynote Speech: Computational museology: 'whole of environment' encoding
- 12:00 - 13:30 Participatory Approaches, Crowdsourcing and New Technologies  
Emerging Technologies and Visitor Engagement in Museums and Heritage Sites
- 14:30 - 15:30 Keynote Speech: The collection is dead; long live the collective
- 16:00 - 17:30 Digital Storytelling for Cultural Heritage Interpretation
- 16:00 - 17:15 Mobile Applications and Gamification for Cultural Heritage

# Keynote Speech

10:30 - 11:30

10:30 - 11:30

## Computational museology: 'whole of environment' encoding

Sarah Kenderdine<sup>1</sup>

<sup>1</sup>École polytechnique fédérale de Lausanne (EPFL), Laboratory for Experimental Museology, Switzerland

This paper explores the work of the laboratory for experimental museology (eM+), a transdisciplinary initiative at the intersection of imaging technologies, immersive visualisation, visual analytics and digital aesthetics. In the framework of computational museology, eM+ engages in research from scientific, artistic and humanistic perspectives and promotes a post-cinematic multisensory engagement using experimental platforms. This research explores the ways in which mechanistic descriptions of database logic can be replaced and computation can become experiential, spatial and materialized; embedded and embodied in a 'landscape for the senses'. Such a framework unites, artificial intelligence with data curation, and ontology with visualization and, community with embodied participation through immersive and interactive interfaces.

\*The full paper can be found in the RISE IMET proceedings:

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

### Bio Note:



Professor Sarah Kenderdine researches at the forefront of interactive and immersive experiences for galleries, libraries, archives and museums. In widely exhibited installation works, she has amalgamated cultural heritage with new media art practice, especially in the realms of interactive cinema, augmented reality and embodied narrative. In 2017, Sarah was appointed Professor of Digital Museology at the École polytechnique fédérale de Lausanne (EPFL) and is director and lead curator of a new art/science initiative EPFL Pavilions, reaching beyond object-oriented curation, to blend experimental curatorship and contemporary aesthetics with open science, digital humanism and emerging technologies.



# Participatory Approaches, Crowdsourcing and New Technologies

12:00 - 13:30

Chair: Angeliki Chrysanthi  
University of the Aegean

12:00 - 12:15

## Participation in cultural heritage hackathons: ‘carsharing’ between ‘meaningful nonsense’ and ‘unromantic’ networking

Franziska Mucha<sup>1</sup>

<sup>1</sup>University of Glasgow, School of Humanities, Information Studies, United Kingdom

This paper addresses the question why hackers participate in cultural heritage hackathons and argues for a participant-centered shift in qualitative research of digitally-enabled participation in the cultural sector. It is based on an ethnographic study of the Coding da Vinci West hackathon, including participant observation and semi-structured interviews. Three interrelated motivational factors of hackers were identified: the role in which they join, the hackathon characteristics they build on, and the connection with culture they strive for. Two groups of hackers formed around these factors: one hobby-oriented group interested in creative doing and one work-oriented group driven by professional networking. Their relations with cultural heritage institutions were either outcome-oriented or process-oriented. While the social aspect of hackathons was important for all hackers, the relevance of learning and doing were unequally distributed. However, the study also found that mostly cultural digital experts participated in the hackathon. Building on previous research, a stronger emphasis on mediating skillful practices and an invitation process based on ‘areas of curiosity’ instead of predefined skilled roles would potentially speak to a wider group of participants and thus support the goals of opening up collections through digitization more effectively.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

12:15 - 12:30

## The shaping of memory and identity through digitised photographs of institutional repositories

Myrto Theodoridou<sup>1</sup>

<sup>1</sup>Cyprus University of Technology, Multimedia and Graphic Arts, Cyprus

As part of the process of entering the digital era, many collecting institutions create and maintain online repositories. The digitisation of the cultural sector as studied from the fields of archival and museum studies, has altered institutional boundaries (Bountouri, 2017; O’Hagan Hardy, 2018), and “the ways in which people can participate in the creation, production and distribution of digital culture” (Marttila, 2018, p. 15). However, ‘memory’, as one of the anticipated priorities of collecting institutions (Trant, 2009) in helping future generations to remember the past (Dupont, 2007) remains a timeless value through this digital transition.

Previously, the audience of institutional repositories has been mainly studied quantitatively using web-traffic analytics and web-surveys within institutional platforms. Automatically, this approach excludes the general understanding of whether institutional resources are selected or not by the digital publics, and overlooks the level of outreach of institutional platforms in everyday browsing practices of people, especially concerning memory and identity work. This paper aims to fill this gap by examining the use of digitised photographic resources within and outside of institutional settings and to consider how memory and identity work is embedded in the strategies and practices of collecting institutions in comparison to the online everyday life of individuals and groups.

Smithsonian Learning Lab (SLL) has been selected, as an institutional platform under study, since it facilitates the creation of users' collections within the platform which allows for the consideration of how memory practices are influenced by and in turn influence institutional frames. A systematic content analysis of one of the SLL's sets of collections, namely, the Asian Pacific Americans (APA2018), will be conducted to study the themes, the photographic resources and the source preferences of the collections' creators and examine whether and how the concepts of memory and identity are addressed by the users through APA2018 collections.

Likewise, to shed light on the understudied possible users of institutional repositories, the research deploys a top-down approach case study, of two Facebook groups which are dedicated to old photographs from Cyprus. Through the in-depth semi-structured interviews with Facebook group members, the research aimed to investigate the photographic resources and the source preferences of the research informants, and also examine whether and how and identity work intervene with members' source choices of digitised photographs.

Finally, the paper examines whether this analysis of actual (re)use of digitised photographs, could act as a helpful tool for institutions to improve the future heritage strategies and experience.

12:30 - 12:45

## The Fragility of Museum Social Media Practices

Cassandra Kist<sup>1</sup>

<sup>1</sup>University of Glasgow, School of Humanities, Information Studies, United Kingdom

Within the museum sector, research and associated theories on technology can often lead to rhetoric on progression that results in the idealization of the new or the emergent. However, if we approach technologies with a sensitivity towards their fragility, we see it is not always progression that is most interesting, but processes of repair. Social media, it can be argued, is an outdated technology which has lost its excitement and like the larger ideals associated with digital in the cultural heritage sector, is perceived with skepticism. Yet, with the rise of the museum's social role, museums have an ethical responsibility to understand the factors that shape how social media practices are enacted. In this paper I take on perspective of repair to explore the intersection between social media and organizational structures through an in-depth ethnographic case study of Glasgow Museums Services (Glasgow, UK). The analysis provides essential insights into the (dis)-connections between museum social media practices

and museum infra-structure. It suggests that the desire for more participatory social media practices overlooks the underpinning and incompatible elements of the museum institution.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

12:45 - 13:00

## Storybase: towards Cultural Transformation Driven by Design

Violeta Tsenova<sup>1</sup>

<sup>1</sup>Newcastle University, History, Classics and Archaeology; Open Lab, United Kingdom

Rising emphasis on the creation of participatory experiences in museum and heritage environments has resulted in the increasing implementation of technological and interactive interventions. For this participation to result in radical transformation of the interaction between audience and institution, there is a need to closely examine the way participatory interventions are designed and created, as well as the culture within which this “making” occurs. In this paper, I reflect on the process of introducing a new interaction and knowledge-generating paradigm within a traditional museum institution. I delve into the story of Storybase – an interactive system that explores new ways of “knowing” and “telling” by embracing audience contributions as accepted forms of expertise and incorporates them into the museum’s visitors offer. By detailing Storybase’s conceptual direction and development, I offer lessons learned from embracing failed ideas within the design process as a means of making interactive cultural experiences polyvocal, dialogical, and an intrinsic part of the visitor experience long-term. Further, I propose that the inherent value of implementing a design cycle, such as the one exemplified by Storybase, is not only about the outcome, but rather frames the process itself as “the work” that contributes to institutional transformation.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

# Emerging Technologies and Visitor Engagement in Museums and Heritage Sites

12:00 - 13:30

Chair: Giorgos Papaioannou  
Ionian University

## On digital interactions and visitor engagement

Giasemi Vavoula<sup>1</sup>

<sup>1</sup>University of Leicester, Museum Studies, United Kingdom

Visitor engagement is a task to be undertaken by the whole of the organisation, from museum marketing and PR who are tasked with providing a stimulus to visit, to front-of-house services who are tasked with placing visitors in the right frame of mind for engagement to ensue, to exhibition design and learning programming who are tasked with providing visitors with the motivation and support necessary to engage with the museum and its collections (Black 2012). Deep engagement stems gradually from activities that visitors are intrinsically motivated to undertake, and it starts with exhibits offering a hook that appeals to visitor curiosity and personal interest, then goes on to offer opportunities for sensory, intellectual and emotional involvement that lead to a state of 'flow' (Csikszentmihalyi and Hermanson 1995). Bitgood (2010, 2013) analyses engagement as a process of deepening attention to the contents of the museum, where visitor attention is first captured, then focused and finally engaged as visitors respond to environmental stimuli until they "become involved in exhibit content" (Bitgood 2013, p194). In their Active Prolonged Engagement model, Humphrey et al. (2005) explain that the qualifiers 'active' and 'prolonged' emphasise the importance of visitor agency in interactions with exhibits that lead to deeper engagement for sustained periods of time.

The above theoretical accounts of visitor engagement portray it as a gradual process of winning visitors' attention and channeling it into sustained, hands-on and minds-on interactions with the museum's content. While recent years have seen a proliferation of digital technologies and tools being weaved into the visitor experience, digital interactions are often studied separately from other engagement behaviours in the museum and have not been included explicitly in the profiling of visitor engagement. This paper calls for an operational definition of visitor engagement that can provide clarity as to the kinds and configurations of digital and other interactions that constitute engagement. After presenting the criteria that it must satisfy, an operational definition of visitor engagement will be proposed and its implications for the design and evaluation of digitally-enhanced visitor engagement will be discussed.

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12:15 - 12:30

## Trails of Walking- Ways of Talking: The Museum Experience Through Social Meaning Mapping

Dimitra Christidou<sup>1</sup>, Luise Reitstätter<sup>2</sup>

<sup>1</sup>Norwegian University of Science and Technology, Department of Computer Science, Norway

<sup>2</sup>University of Vienna, Department of Art History, Austria

This paper discusses the digital method Social Meaning Mapping (SMM) and its affordances for capturing aspects of the museum visit. SMM, embedded in the Visitracker tablet-app, enables the annotation of visitors' movement and interactions in a particular gallery room post-visit. During a researcher led session, visitors handle the tablet and annotate their experience on its screen while sharing their thoughts aloud. Both visitors' annotations and their voices are being recorded through the app. Each SMM can be accessed through Visitracker's portal as a video which re-creates visitors' 'trails of walking' (what they mark) and their 'ways of talking' (what they say) in synchronization. In this paper, we draw upon data collected at the Austrian Gallery Belvedere in Vienna to argue that SMM created by visitors can complement tracking and timing (T&T) data that researchers collect, allowing for a more holistic understanding of the museum experience. The analysis shows that SMM captures visitors' experiences in a multimodal way, both visual and verbal, enabling them to foreground aspects of their personal experience, spatial practices, co-experience and social realms of their visit.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

12:30 - 12:45

## Adoption and Impact of Digital Ecomuseum in Cities: Insights from the Pros-Eleusis evaluation activities

Yannis Pappas<sup>1</sup>, Leonidas Argyros<sup>1</sup>, Despoina Tsiafaki<sup>2</sup>, Maria Boile<sup>3</sup>, Panagiotis Gkiokas<sup>1</sup>, Natasa Michailidou<sup>3</sup>, Vassilis Kourtis<sup>3</sup>, Akrivi Katifori<sup>4</sup>

<sup>1</sup>Mentor in Culture & Heritage, Greece

<sup>2</sup> Institute of Language and Speech Processing, Greece

<sup>3</sup>"ATHENA" Research and Innovation Center, Institute of Language and Speech Processing, Greece

<sup>4</sup>"ATHENA" Research and Innovation Center, Institute for Language and Speech Processing, Greece

The research project Pros-Eleusis (Personalized ROuteS in Eleusis) adopts the innovative approach of digital ecomuseum to protect, manage, interpret, and digitally display in situ the

natural and cultural heritage -both tangible and intangible- of the city of Eleusis, which is the European Capital of Culture for 2021. The overarching goal of Eleusis Digital Ecomuseum is to combine the past and the present providing simultaneously a path towards a sustainable future for the area.

Within the project, a set of digital tools and methodologies for authoring and experiencing personalised or pre-defined thematic routes in the city are designed, developed, implemented and tested. This paper focuses especially on the outcomes of the project's evaluation activities sharing insights on the impact that the Pros-Eleusis approach and tools have on users' experience.

The Ecomuseum of Eleusis unfolds on numerous points of interest within the city, which are presented to the visitors in a personalised manner, and on three specific thematic routes, i) the ancient Eleusis, ii) the contemporary industrial heritage, and iii) the environment. By selecting a thematic or a personalised route, the visitors are directed into a trail of discovery and exploration of the natural wonders, the history, and the culture of Eleusis enhanced with text, voice, images and video. The Ecomuseum is implemented through extensive multidisciplinary research and collaboration among humanities scholars, IT providers, local actors in Cultural Heritage and Tourism, local associations, and the residents of the area.

In order to capture the impact of Pros-Eleusis digital tools and to fulfill its ultimate goal, namely the satisfaction of the visitor, central to the project is a user- and visitor-centric evaluation process. This process places visitors, residents, and cultural stakeholders at the centre of defining the ecomuseum experience, and skilling them in deploying the Pros-Eleusis methodology and tools.

Following the widely accepted evaluation practice in museum and heritage visitor evaluation (Borun and Korn, 1999; Diamond, Horn, & Uttal, 2016: 3-4), we employ a holistic multimethod and multilevel approach, covering not only usability of Pros-Eleusis tools, but also the experience of both thematic and personalised routes. A mixed-methods approach is followed, employing both qualitative and quantitative techniques. This is especially useful to understanding complex phenomena and can provide a more holistic understanding of different facets of a project (Greene & Caracelli 1997). The on-going Pros-eleusis evaluation activities have already produced interesting findings leading to guidelines on the design of the technology and content to support effectively the complexity of the Ecomuseum approach.

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## Why is this exhibit digital? – dimensions of digital exhibits in the museum space

Pille Runnel<sup>1</sup>, Pille Pruulmann-Vengerfeldt<sup>2</sup>, Krista Lepik<sup>3</sup>

<sup>1</sup>Estonian National Museum, Research department, Estonia

<sup>2</sup>Malmö University, School of Art and Communication, Sweden

<sup>3</sup>University of Tartu, Institute of social Studies, Estonia

Digital objects have controversial roles in the exhibition space (Hornecker & Ciolfi 2019, Hossaini & Blackenberg 2017), ranging from being a vague 'must be' element at the exhibitions signifying their contemporaneity, to being a crucially important design tool, supporting contemporary museum experience. Departing from the museum communication studies, this article seeks to provide an analytical framework about the digital exhibits within the exhibitions. Based on a case study at the Estonian National Museum, we look at the potential role of the digital exhibits by using analytical dimensions, which have been strategically, although not always consciously utilized in the exhibition development: 1) Spatiality – what kind of potentials or limitations are related to space-bound digital elements? 2) Temporality – how changeable or stable is the content? Several authors (Hornecker & Ciolfi 2019; Tatsi 2013) have discussed the social dimension of the museum referring to the critiques that the digital elements at the museum space invite solitary experiences. Understanding digital exhibits from the perspective of 3) private-public dimension as well as 4) single-multi-user aspects allows for a better understanding of the sociability dimension. 5) Increasingly, narrating the past depends on the fusion of fictional-documentary formats. We will also look at the dimensions of 6) authoritative-collaborative voice and 7) openness or determinedness of the interpretation. Outlining some of the theoretical underpinnings through concrete examples, we argue for the heuristic value of these dimensions in understanding visitor engagement.

### References:

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\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

# Keynote Speech

14:30 - 15:30

14:30 - 15:30

## The collection is dead; long live the collective

Nancy Proctor<sup>1</sup>

<sup>1</sup>The Peale, Baltimore, United States

Originally titled, “From Treasure House to Production House: Community-driven storytelling and the ‘born digital’ collection in the museum as distributed network,” this paper began as an attempt to share the storytelling and “digital first” strategies being developed at the Peale in Baltimore, Maryland. Inspired by the “new citizenship” approach to organizational participation developed in the UK [1] and leading work in the cultural sector presented at the international MuseWeb conferences among others, the Peale is an experiment in dismantling museum hierarchies, from the primacy of the object to the curatorial process, with the aim of transforming the 21st century museum from treasure house into a production house of culture. After the RISE-IMET conference at which this paper was to be presented was postponed due to the pandemic, this thesis had to be expanded to take into account the impact of 2020’s quarantines on museums. The closure of physical institutions globally, and the corresponding pivot to online content and audiences, compels us to redefine “collection” in the post-pandemic museum as more than content, be it digital or analog, and instead put the expanded concept of “collective,” including content and its connections with creators and audiences – i.e. stories – at the heart of the museum’s purpose and economy.

### References:

1. New Citizenship Project website <https://www.newcitizenship.org.uk/> and in particular The Citizen Shift report <https://www.citizenshift.info/>, last accessed 2020/12/20.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

### Bio Note



Nancy Proctor is Director of The Peale Center for Baltimore History and Architecture as well as Co-chair of the MuseWeb (formerly Museums and the Web) Conferences. Previously Nancy was Deputy Director of Digital Experience and Communications at the Baltimore Museum of Art (2014-2016), Head of Mobile Strategy and Initiatives at the Smithsonian Institution (2010-2014), and Head of New Media Initiatives at the Smithsonian’s American Art Museum (2008-2010). With a PhD in American art history and a background in filmmaking, curation and art criticism, Nancy lectures and publishes widely on technology and innovation in museums, in French and Italian as well as English. Nancy Proctor created her first online exhibition in 1995 and went on to publish the New Art CD-ROM and website of contemporary art in the UK in 1996. She co-founded TheGalleryChannel.com in 1998 with Titus Bicknell to present virtual tours of innovative exhibitions alongside comprehensive global museum and gallery listings. TheGalleryChannel was later acquired by Antenna Audio, where Nancy led New

## Oral Presentations

Product Development from 2000-2008, introducing the company's multimedia, sign language, downloadable, podcast and cellphone tours. She also directed Antenna's sales in France from 2006-2007, and worked with the Travel Channel's product development team. Nancy served as program chair for the Museums Computer Network (MCN) conference 2010-2011, and co-organized the Tate Handheld conference 2008 & 2010. She started MuseumMobile.info, its wiki and podcast series in 2008. She was Digital Editor of Curator: The Museum Journal from 2009-2014, and is now on the Journal's editorial board, as well as on the Board of Directors of the Omnimuseum Project.

# Digital Storytelling for Cultural Heritage Interpretation

16:00 - 17:30

Chair: Katherine Burton Jones  
Harvard University Extension School

16:00 - 16:15

## Place-based Digital Storytelling. The interplay between narrative forms and the cultural heritage space

Angeliki Chrysanthi<sup>1,2</sup>, Akrivi Katifori<sup>3,4</sup>, Maria Vayanou<sup>5</sup>, Angeliki Antoniou<sup>6</sup>

<sup>1</sup>University of the Aegean, Department of Cultural Technology and Communication, Greece

<sup>2</sup>Athena, Research Center, Greece

<sup>3</sup>National and Kapodistrian University of Athens, Department of Informatics and Telecommunications, Greece

<sup>4</sup>Athena, Research Centre, Greece

<sup>5</sup>National and Kapodistrian University of Athens, Department of Cultural Technology and Communication, Greece

<sup>6</sup>University of West Attica, Department of Archival, Library & Information Studies, Greece

Location-based storytelling has been extensively used in cultural heritage sites aiming to construct knowledge about the significance of their past to contemporary audiences in an engaging way. From the majority of research and practical implementations that are concerned with hybrid forms of storytelling in cultural heritage sites, only a few systematically explore the function of narrative forms in an interactive place-based experience. This paper provides a background on the theory and practice of interactive place-based storytelling. An analytic and comparative discussion on best practice examples from the domain is conducted in order to assemble the lessons learnt. Finally, we provide a synthesis and discussion in view of the new developments and challenges in the field while revealing persisting problems and creative solutions.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

16:15 - 16:30

## REVAthens: Bringing Athens of the Revolution to life through museum theatre methodology and digital gamification techniques.

Yannis Stoyannidis<sup>1</sup>, Andromache Gazi<sup>2</sup>, Ilias Marmaras<sup>3</sup>, Foteini Venieri<sup>4</sup>, Thodoris Giannakis<sup>5</sup>, Yannis Scoulidas<sup>3</sup>, Stewart Ziff<sup>3</sup>

<sup>1</sup>University of West Attica, Archival, Library and Information Studies, Greece

<sup>2</sup>Panteion University of Social and Political Sciences, Department of Communication Media and Culture, Greece

<sup>3</sup>collective, Personal Cinema, Greece

<sup>4</sup>Panteion University of Social and Political Sciences, Communication Media and Culture, Greece

<sup>5</sup>Greece

REVAthens is a project that lies at the intersection of history, public history, museum theatre, gamification, and digital narration. It aims at creating alternative readings of the Revolution and at highlighting different approaches to it through the narrative of historical characters who lived at the time. REVAthens aims to renegotiate banal narratives of the Revolution by highlighting new perspectives on historical events and historical subjects that may challenge and/or break down previous perceptions and/or stereotypes. The project utilizes the methodology of museum theatre with the aim of shaping examples of historical subjects who lived during the Revolution of 1821 in Athens and who mediate their experiences to a contemporary audience through a digital application with game elements.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

16:30 - 16:45

## Bridging Past and Present: A Case Study of Creating and Deploying a Historical Character to Engage Audiences through AR and VR

Juilee Decker<sup>1</sup>, Amanda Doherty<sup>2</sup>, Joe Geigel<sup>3</sup>, Gary Jacobs<sup>4</sup>

<sup>1</sup>Rochester Institute of Technology, Museum Studies Program, United States

<sup>2</sup>Rochester Institute of Technology, Fine Arts, United States

<sup>3</sup>Rochester Institute of Technology, Computer Science, United States

<sup>4</sup>Rochester Institute of Technology, 3-D Design, United States

This article describes the creation and deployment of a virtual tour guide as a means of delivering content and enhancing the visitor experience at the third-largest living history museum in the United States. Our work differs from other museum applications in AR and VR by focusing on narrative storytelling from the point of view of an historical character; by employing place-based engagement within a historical context; and by showcasing a historical figure who has an authentic connection to the museum environment he inhabits. Our goals with the project are three-fold. First, we provide an overarching narrative about life in western New York during the 19th century through the telling of five digitally-rendered characters whose stories are recounted in short-form vignettes shared with audiences. Second, we endeavor to develop “thinking dispositions” that encourage visitors to gauge and construct the significance of historical narratives that have the capacity to motivate reflection upon these stories on a personal, local, and global level. Third, we outline our foundation for a tripartite deployment that enables various levels of accessibility while responding directly to the health safety concerns raised by COVID-19. In sum, our project offers first-person

accounts of the past mediated via XR, a blending of past and present to enhance the visitor experience.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

16:45 - 17:00

## The (too) Reliable Narrator. Studying the impact of AI on visitors' narratives

Valentina Vavassori<sup>1</sup>

<sup>1</sup>King's College London, Digital Humanities, United Kingdom

In the contemporary world, people simultaneously live in digital and physical places, on the ground and on the Cloud (Hinton, 2014) (De Souza e Silva, 2006). It is therefore comprehensible that museums are developing an interest for new technologies applied to the museum visit, such as AI, and the potential to attract new audiences: their unphysical nature offers the capability to create new connections between physically distant places and/or objects, to reconstruct past context(s) and to propose multiple, diverse narratives within the same environment, the museum. However, the adoption of these technologies is far from uncomplicated (e. g. Kahr-Højland, 2010). Digital narratives can be used to attract new audiences but they can also exacerbate existing, contrasting visions of the museums (Smith, 2006) (Gibson and Taylor, 2016). Studying their impact of visitors requires new methodologies and reflections on ethical implications such as data gathering, privacy and transparency (Young, 2017) (Leslie, 2019).

Starting from the ethnographic observations, interviews and surveys conducted inside three house museums in Milan (Museo Poldi Pezzoli, Museo Bagatti Valsecchi and Casa Museo Boschi Di Stefano) which developed a treasure hunt chatbot together, the paper explores the impact of the chatbot on the visitors narratives, how they perceived the chatbot both as digital placemaking aid, game (e.g. Hjorth & Richardson, 2017) and conversation and how it turned out to be a too reliable narrator (Goswami, 2019) which visitors rarely contradict.

It also considers how it is possible to study the impact of new technologies for museum visit using digital methods, such as deep mapping (Dunn, 2019) (Bodenhamer et al., 2015) (Roberts, 2016) and network analysis, how these methods can be used in integration with more traditional ones and what their limits are.

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# Mobile Applications and Gamification for Cultural Heritage

16:00 - 17:15

Chair: Panagiotis Charalambous  
CYENS Centre of Excellence

16:00 - 16:15

## Interdisciplinary design of an educational applications development platform in a 3D environment focused on cultural heritage tourism

Konstantinos Kotsopoulos<sup>1</sup>, Julia-Anna Sharamyeva<sup>2</sup>, Stavros Vlizon<sup>3</sup>

<sup>1</sup>University of Patras, Department of Computer Science, Greece

<sup>2</sup>University of Athens, Department of History and Archaeology, Greece

<sup>3</sup>Ionian University, Department of Archives, Library Studies, Museology, Greece

This paper is intertwining the technology, education and public archaeology sectors in a case study approach of the archaeological site of the Sanctuary of Amyklaion, an important center of human activity in ancient Sparta, Greece. The creation of an innovative digital platform for the development of educational applications focused on cultural heritage tourism with the use of extended reality and gamification elements is presented. The applications are designed to be managed by a central documentation platform in a 3D environment produced by the digitization of the archaeological site, the excavation and archaeological finds. The main goal in the creation of this platform is to enhance the experiential learning of visitors of the archaeological site and the involvement of communities in the production and consumption of knowledge through new media, using educational methodologies and a human-centered ambient intelligence approach.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

16:15 - 16:30

## Que.St: game design strategies as a tool for promoting cultural heritage of Saint - Petersburg

Lada Maksimova<sup>1</sup>, Antonina Puchkovskaya<sup>1</sup>

<sup>1</sup>ITMO University, Digital Humanities Research Center, Russia

At the beginning of the 21st century digital technologies are proved to play a significant role in heritage management. Considerable number of contemporary projects for heritage conservation focus primarily on digitalization of the cultural sites. This process entails the formation of a new mechanism of historic objects' representation through their virtual images.

The paper raises the questions of cultural heritage data representation, as well as building up the user-friendly interface both interactive and educational. Project "Que.St" is an attempt to answer these questions. The project team endeavors to find and maintain the balance between tangible and digital bodies of cultural sites creating a mobile application that

provides an interactive game user interface to convey information stored in an extensive database of culturally significant locations of Saint Petersburg.

The project Que.St is being carried out by Digital Humanities Research Center at ITMO University with the support of the local museums and libraries. The database includes repository of more than 1000 historical sources provided by Russian National Library and incorporates information on approximately 900 locations and 1000 related historical figures. The map interface is structured around relations between locations and historical figures, which corresponds with the concept introduced by Russian philosopher Nikolay Fyodorov who determined heritage not as the variety of material objects but as living memory about our predecessors. Users will be able to search for historic figures around the city and form their personal collections as a part of the game process. In addition, the application offers a library of themed quests and interactive novels to provide immersive experience into historic narratives. Game mechanics such as experience points, collectibles and achievements are designed to encourage user's activity and increase the engagement into the learning process.

Considering the discursive and associative nature of heritage that has been pointed out by various scholars, the developer's team try not to limit application content to institutionalized interpretation of the heritage. That is why Que.St is designed as an open source project. The bigger mission of the project, therefore, is not only to raise awareness about culturally significant sites among the local community but also to engage its members into evaluation of historic locations and identification of their cultural significance.

16:30 - 16:45

## Emerging technologies for learning at a cultural heritage sites: The design of the CompARe mixed reality gamified learning environment

Eleni Kyza<sup>1</sup>, Markos Souropetsis<sup>2</sup>

<sup>1</sup>Cyprus University of Technology, Communication and Internet Studies, Cyprus

<sup>2</sup>Cyprus University of Technology, Department of Communication and Internet Studies, Cyprus

Knowledge of the past is necessary in order for us to understand the present and move forward to the future. Learning about cultural heritage should take place in situ, so that students can have embodied experiences, and come into contact, with the artifact or the monument they study. On the other hand, educating young students about cultural heritage is a challenge especially when connected with educational programs in schools, due to lack of interest from students. A promising solution to this challenge might be the use of gamification, namely the use of game design elements in non-game contexts, which is believed to improve both students' learning outcomes and engagement. Furthermore, recent review studies about the use of mixed reality technologies in educational settings suggest that they can potentially support learning and teaching (de Belen et al., 2019). According to the NMC Horizon Report: 2016 Museum Edition (Freeman et al., 2016), it is important to evaluate the impact of the use of new technologies at cultural heritage sites, and specifically the impact of new digital tools on learning.

This contribution reports on the development and empirical investigation of the “CompARe” mixed reality (MR) gamified learning environment. “CompARe” was designed to support inquiry learning around a unique 6th century ceiling mosaic of Virgin Mary at the village of Kiti in Cyprus; the mosaic is located in a church on the UNESCO World Heritage Tentative List and is considered to be one of the most significant ceiling mosaics of the early Christian art.

The validation was based on two studies, following a design-based research methodology. A pilot study to empirically validate the MR gamified learning environment was conducted with the participation of 15 upper elementary students using “CompARe” in dyads. Data were collected through a focus group interview, during which the students shared their experience with the environment, and led to the refinement of the initial design of the learning environment as well as identified problems that related to students’ motivation and challenges during the use of the gamified environment. For the second study, data were collected during three educational field trips to the cultural heritage site of three sixth grade classes. Fifty-nine students participated (25 boys), aged 11 – 12 years, from a medium-sized, rural school in Cyprus. Students worked in dyads and one triad, the composition of the pairs was decided by their teachers. The data corpus consists of pre- and post-test questionnaires to evaluate students’ learning gains, video recordings of students’ discourse and interactions, log files from the app, and post-interviews. The challenges ahead and next steps of this work will be reported at the conference.

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Thursday, 03 June

## Oral Presentations

10:30 - 11:30 Keynote Speech: Being Ethical in Digital Cultural Heritage Practice

12:00 - 13:30 Galleries, New Technologies and Art

Digital Curation and Immersion in Museums

14:30 - 15:30 Keynote Speech: Realistic Humans in Virtual Cultural Heritage

16:00 - 17:30 Mixed Reality in Museums and Heritage Sites

Emerging Technologies, Difficult Heritage and Affective Practices

# Keynote Speech

10:30 - 11:30



10:30 - 11:30

## Being ethical in digital cultural heritage practice

Jenny Kidd<sup>1</sup>

<sup>1</sup> School of Journalism, Media and Culture, Cardiff University

As digital media have become more embedded within our institutions we have seen something of an inward turn as practitioners begin a process of reflection and ask searching questions about the kind of digital culture we have been privileging, and to what end. Foregrounding a discussion about values is an important part of that process of reflexivity, and will continue to be, as far-reaching questions are asked about the ethical dimensions of our digital futures, and of our increasingly digitised pasts. This presentation will introduce a range of challenges and make the case for a renewed commitment to ethical - and just - digital heritage practices.

### *Bio Note:*



Dr. Jenny Kidd is Senior Lecturer in the School of Journalism, Media and Culture at Cardiff University. She researches across the fields of digital heritage, ethics and immersive media, often in partnership with those working in the cultural sector. Jenny is author of *Museums in the New Mediascape: Transmedia, Participation, Ethics* (Routledge 2014) and *Critical Encounters with Immersive Storytelling* (Routledge 2019), and has published extensively in Journals such as *The International Journal of Heritage Studies*, *Museum and Society*, *The Curator* and *Information, Technology and People*. Jenny has been a core project partner on a number of immersive heritage projects, including *With New Eyes I See* (2014) and *Traces/Olion* (2016).

# Galleries, New Technologies and Art

12:00 - 13:30

Chair: Alexandra Bounia

University of the Aegean

## Curating networked objects: the mediation of contemporary art digitizations online

Stéphanie Bertrand<sup>1</sup>

<sup>1</sup>Aristotle University of Thessaloniki, Faculty of Engineering, School of Architecture, Greece

While CH institutions have increasingly strived to digitize their collections to make them available to the public online, contemporary artists, galleries and institutions have long been accustomed to uploading images of artworks on their respective websites, mainly for promotional purposes. Notwithstanding, the curation of contemporary art digitizations remains thin. Although there is a substantial history of innovative, web-based curatorial projects and exhibitions of digitally-native artworks, the online mediation of contemporary artworks originally created for a physical setting has scarcely evolved. It still largely relies on: 1) the colonization of commercial image-based and social media platforms (e.g., Pinterest, Instagram), which invariably subject the content to interface constraints, often making it hard for audiences to disambiguate it from marketing campaigns; and 2) simulations of in-gallery experiences, either through photo and video documentation, virtual tours or 360-degree capture, reaffirming the primacy of the in person visit. Smith (2014) argues that these skeuomorphic approaches to “online exhibitions” reveal a lack of authentically digital, curatorial processes. According to Schweibenz (2013), the reason why art institutions have been reluctant to create virtual exhibitions is due to questions of authenticity and mediation. While these accounts are accurate, what related discussions have overlooked is the extent to which prevailing in-gallery group exhibitions mirror online collection databases. In curatorial literature, the institutional group show has been variously described as a flea-market (Krauss, 1996) and database (Relyea, 2017), providing modular experiences based on personal preferences.

Although there are marked differences in engagement between in-gallery exhibitions and online displays (i.e., embodiment and sociality), both struggle with the same paradox in contemporary culture: an excess of didacticism and renewed need for mediation (Lind, 2013). The shortcomings of didactic approaches in virtual museum applications have been discussed (Perry et al., 2017); however, little attention has been paid to the fact that user experiences online (like offline) remain predicated on a privileged encounter with the singular artwork – as demonstrated by the widespread emphasis on the “digital aura” – when contemporary art digitizations now function as networked objects (Cameron and Mengler, 2009).

This paper will argue that to resolve the abovementioned paradox, authentically digital, curatorial mediations of contemporary art digitizations cannot be rooted in a unique encounter with the singular artwork. Moreover, they must reintroduce a substantial degree of complexity (i.e., unpredictability/surprise, and hence informational density) in the relationship between artworks online. Far from sacrificing aesthetic experience, the claim is that this will effectively adapt it to a web-based context.

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12:15 - 12:30

## Virtual Art Viewing for Education and Learning (VAVEL): A tool for automatic Virtual Art Space creation for students and artists

Joshua Siegel<sup>1</sup>, Vicky Karaiskou<sup>2</sup>, Georgios Pappas<sup>3,4</sup>

<sup>1</sup>Michigan State University, Computer Science and Engineering, United States

<sup>2</sup>Open University of Cyprus, Humanities and Social Sciences, Cyprus

<sup>3</sup>Open University of Cyprus, Lab of Educational Material and Methodology, Cyprus

<sup>4</sup>Michigan State University, Department of Electrical and Computer Engineering, United States

Games have become increasingly popular for creating pedagogically-sound and engaging educational experiences (Paravizo & Braatz, 2019). Along these lines, we propose “VAVEL” (Virtual Art Viewing for Education and Learning), a cross-disciplinary framework for automatic generation of virtual art spaces. VAVEL helps instructors create simulated art spaces by easing curation and dynamically creating exhibits for various curios at runtime. These exhibits can showcase student work or support broader learning goals.

Built upon the Unity 3D Game Engine, VAVEL’s in-game camera emulates the player’s first-person viewpoint. Users have the opportunity to explore sections of the Art Space featuring student or other artists’ photos and paintings. Instructors, or “Virtual Art Space Curators,” may customize the exhibits by placing or reordering features using an interactive and extensible tool. This process is completed without changing source code, making curation accessible to a broad audience.

“VAVEL” is the two-year evolution of a student’s project, putting neuroscience into practice: according to neuroscientists and psychologists, the human brain automatically interprets incoming information – in the form of words or images – in the context of pre-existing memories and experiences (Chun & Jiang, 1998). The concept of VAVEL applies in everyday life and relates to all humans: it showcases how meaning varies and the communication gaps created by the diverse interpretations and connotations we attribute to words and images. Though aspects of these interpretations are collectively shared among members of the same

cultural groups, there can still be much variation and diversity stemming from individual memories, experiences, and the resulting sense-making processes.

“VAVEL” challenges the illusion of sameness and the notion of reality, and brings about questions such as how our affect – deriving from our interpretations – and our re-actions – a consequence of our affect – shape certainties and attitudes in the present, regulate our projections of the future, and constrain us to certain future prospects while excluding others.

When complete, “VAVEL” will be a cutting edge tool for students and artists to visualize their art and make it available to others remotely. More importantly, it will make art available along with its associated context, coloring the viewers’ interpretation of the pieces and the exhibit and bringing about new and exciting questions relating to perception and interpretation. Future updates will include a Virtual Reality version of the learner-facing tool, offering them the opportunity to experience a visit more immersively.

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12:30 - 12:45

## Artwork Recognition Using Wearable Cameras: Methodologies, Challenges and Potential Uses

Zenonas Theodosiou<sup>1</sup>, Harris Partaourides<sup>1</sup>, Andreas Lanitis<sup>1, 2</sup>

<sup>1</sup>CYENS Centre of Excellence, BIO-SCENT MRG, Cyprus

<sup>2</sup>Cyprus University of Technology, Dept. of Multimedia and Graphic Arts, Cyprus

The new era of museums aims to become more interactive, informative and mesmerizing, to provide the visitor an integrated experience that maximizes both knowledge acquisition and entertainment. The study of museum visitors has been a rapidly evolving topic within the museum research community which is interested in analysing visitors' activities, behaviours and experiences and understanding what is happening at museums. Information such as what exhibitions and exhibits do visitors attend to, what exhibits visitors spend most time at, what visitors do when are in front of each exhibit etc. are very important for curators and museum professionals. Several methods have been used to collect and analyse such information including questionnaires and interviews, evidence-based feedback, GPS devices and analysis in virtual environments.

More recently, fixed and mobile cameras have been utilized for automatic tracking of visitors in museums. Although these methods have improved and automated the process of analysing the museum's visit, both fixed and mobile cameras have significant limitations: the

first can only track the flow of visits without focusing on each visitor individually, while the latter can track each visitor individually but not his / her point of view.

Wearable cameras are increasingly being utilized in several applications to enhance the quality of citizens' life. As part of an effort to utilize wearable cameras in museums and art galleries we present a case study of artwork recognition at the State Gallery of Contemporary Cypriot Art. The work involves the capture of a first-person video stream using wearable cameras attached on visitors, and the subsequent image interpretation process to recognize the artworks from the visitor's point of view. We first created a first-person view dataset using the rear camera of a mid-range smartphone placed on the chest of the wearer with a forward-facing direction to replicate a typical visitor of the State Gallery. Thus, we collected images in a real setting with numerous variations of angle and distance from the exhibits. We then trained a deep VGG-16 convolutional neural network to identify artworks appearing in the collected data. To validate our approach, we used the complete tours of two visitors in the State Gallery and identified the artwork appearing in each frame.

The use of wearable cameras offers considerable potential for inferring knowledge, and hence enable many applications that would not be possible with fixed cameras. Our preliminary study demonstrated the feasibility of their introduction in museums and art galleries for enhancing the overall visiting experience and assisting curators and other museum professionals. The initial results on artworks' recognition provide a concrete basis to build on in order to implement an integrated system that works in real conditions. In parallel with the system development, two potential applications will be addressed: The provision of real time information about the identified artwork that a visitor looks at, and the provision of information about the time that visitors look at an artwork so that curators can set exhibits at optimum places. Both intended applications will contribute towards enhancing the experience of visitors.

12:45 - 13:00

## Emerging technologies beyond museums

Vicki Triantafylloudi<sup>1,2</sup>, Trilce Navarrete Hernandez<sup>3</sup>

<sup>1</sup>Hyperco SA, Cultural Project Management, Greece

<sup>2</sup>Erasmus University Rotterdam, MA Cultural Economics & Entrepreneurship, Netherlands

<sup>3</sup>Erasmus University Rotterdam, Erasmus School of History, Culture & Communication, Netherlands

The transition from the 19th century 'white cube' to the digital art spaces, re-conceptualizes the exhibition environment, posing both opportunities and challenges (O'Doherty, 1976). The individual experience is now in the center of curatorial attention and a dynamic process in the experience economy (Pine & Gillmore, 1999). Under such conditions, the immersive art displays emerge to engage visitors through a multi-sensory, digital exhibition environment that goes beyond physical space and allows active participation emotionally and intellectually (Dziekan, 2012). These immersive environments can respond to an increasing demand for art-related leisure activities (Falk, 2016).

This paper will present results of a quantitative analysis of 287 surveys regarding the visitor experience in three immersive art exhibitions in Thessaloniki, Athens and Brussels. Results evidence the opportunities provided by immersive art displays to successfully address various audiences, engage senses, and activate 'leisure learning' (Hooper-Greenhill, 1999). The sample was found highly diverse and, in fact, the majority did not hold a high educational level or experience with museum visiting. A further SPSS statistic analysis was conducted to examine how the personal and social context affected the visiting experience. Respondents reported an overall satisfaction, an increased learning while having fun, as well as the motivation to visit immersive exhibitions in the future.

In addition to reaching new audiences, promoting learning, and stimulating future visits, immersive art displays show the potential to create an exhibition environment that satisfies visitors seeking entertainment, education and sensory stimulation (Davis et al., 1996). This is relevant for museums as it fits in the 'museum service experiences' (Chan, 2013). It implies that an immersive museum is, potentially, a democratic museum, that acknowledges diversity, allows active participation and frees visiting behavior from earlier restrictive curatorial codes (Bedford, 2016; Bennett, 2006).

Should these apparently commercially oriented exhibitions remain a profit seeking enterprise? Or can museums learn from the experience and adapt their curatorial practice?

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# Digital Curation and Immersion in Museums

12:00 - 13:30

Chair: Maria Shehade

CYENS Centre of Excellence



12:00 - 12:15

## An Ontological Model for Digital Curation: Materiality, Aura & Virtuality

Stella Sofokleous<sup>1</sup>

<sup>1</sup>National and Kapodistrian University of Athens, Department of History and Philosophy of Science, Netherlands

This paper will explore fresh insights into the ways we negotiate our ideas about the digital being. I suggest that digitization needs to be understood in the broader context of ontology from a phenomenological point of view, and is also crucial in curatorial practice. I find that the potential and challenges arising from the use of technology, and the value of the virtual gallery object, emphasise the need to recast traditional notions of digital ontology, digital materiality and aura, as normally detracting from authenticity. Consequently, I discuss the materiality of the digital as a possible path for essentializing its nature. In the second part of this paper, I examine the potential of Walter Benjamin's notion of the aura to encompass a significant dimension in comprehending the artworks of the virtual gallery. Finally, I argue that comprehending the ontology of intangible art within a virtual gallery forms a precondition for its proper curational management. Moreover, it is significant in shaping a meaningful shift between the various manifestations of immaterial art: from atoms to bits, objects to processes, the tangible characteristics of traditional art forms to the intangible realm of the digital era.

12:15 - 12:30

## Mapping sonic practices in museum exhibitions – An overview

Foteini Salmouka<sup>1</sup>, Andromache Gazi<sup>1</sup>

<sup>1</sup>Panteion University of Social and Political Studies, Department of Communication, Media and Culture, Greece

Museums are increasingly incorporating sound in their exhibitions both as an exhibit and an interpretative medium. This paper traces the relationship between sound and museums, and then focuses on the integration of sound into the exhibition space. It is noted that, although the functional aspects related to the use of sound in museum exhibitions have been scrutinized, the exploration of sound as an interpretive medium is largely overlooked. To fill in this gap, the paper discusses sonic practices in contemporary museums by focusing on the three main roles accorded to sound in the exhibition environment: informative, interpretive, immersive. The various examples discussed provide ample evidence of the potential of sound in revitalizing the museum experience.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

## Generating "cultural heritage": multimedia displays and immersive experience in the early 20th and 21st centuries. Berlin's Pergamon Museum and Panorama exhibition.

Annette Loeseke<sup>1</sup>

<sup>1</sup>New York University Berlin, Art History/Sociology, Germany

"The size of the image [...], the new sharpness of detail, and the latest lighting and sound technology" make the recently opened exhibition PERGAMON. Masterpieces of the Ancient Metropolis and the 360° Panorama by Yadegar Asisi in Berlin "a spectacular, even bombastic visual experience," as the promotional brochure suggests. Due to the refurbishment of Berlin's Pergamon Museum, the (so-called) Pergamon Altar is currently not on display. During the temporary closure of the Pergamon galleries, a selection of 80 pieces from the Antiquities Collection and a 360° panorama about ancient Pergamon are presented in a temporary multimedia exhibition.

This paper takes the Pergamon Museum and Panorama exhibition as case studies to explore how multimedia displays from the early 20th and 21st centuries generate immersive experiences. Since its opening in 1930, the Pergamon Museum has housed the reconstructions of ancient monuments such as the Pergamon Altar exhibit. The original displays consist of ancient fragments and modern fillings as well as large-scale wall paintings, painted after historical photographs of the excavation sites. The temporary panorama is a pictorial canvas presented in a rotunda of 30 metres in height. Generated through green-screen technique and digital photographs of actors in ancient-style costumes, the panorama offers an all-round view of the digitally reconstructed ancient acropolis of Pergamon. The exhibition also presents a large-scale video-like projection of 3D reproductions of the ancient palace district alongside original statues and historical photographs and drawings of the excavation and reconstruction process.

Drawing on recent literature about the intersection of digital media and museum practice and the virtual space as politically constructed space, I examine how the multimedia panorama spectacle compares to the historical, yet equally spectacular reproductions of ancient monument-facades in the Pergamon Museum. To what extent does the interplay of historical and digital media enhance the visitor experience or provide an alternative insight for visitors? How—and to what end—do the digitally generated images, lighting effects, sound and music in the panorama exhibition encourage immersive experiences and emotional responses of admiration and awe? How do the historic and contemporary multimedia exhibitions frame the excavation, translocation, reconstruction and conceptual appropriation of ancient fragments? What is the role of digital technologies in framing the museum's image and generating authenticity and expertise? By examining the contemporary as well as historic exhibitions, I explore to what extent the use of digital technologies in the panorama exhibition challenges or rather perpetuates the museum's historical hegemonic narrative about the preservation of a pre-given (as opposed to produced) "cultural heritage".

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12:45 - 13:00

## Evaluation and Impact Assessment of Emerging Technologies for Museums and Heritage Institutions: Institutional and Organisational Learning

Areti Damala<sup>1,2</sup>, Merel van der Vaart<sup>2</sup>, Dick van Dijk<sup>3</sup>, Pam de Sterke<sup>2</sup>

<sup>1</sup>Centre national de la recherche scientifique (CNRS), France

<sup>2</sup>WAAG, Stichtung, Netherlands

<sup>3</sup>WAAG, none, Netherlands

Evaluation of technology-mediated learning experiences in museums and heritage settings qualifies as one of the most important challenges in Digital Heritage. Many researchers and practitioners advocate that rather than just evaluating the experience mediated through emerging and established technologies at the very end of a project, one should be able to bring in the picture evaluation throughout the full life-cycle of a digital medium. Taking under consideration the above, this contribution reports on the Evaluation and Impact Assessment strategy deployed within the H2020 mingei project - Representation and Presentation of Heritage Crafts (<http://www.mingei-project.eu/>). The project looks into digitisation for Traditional Crafts through three case studies, each represented by a museum partner: i. the Mastic Museum in Chios, Greece, looks into the traditional craft of Mastic cultivation. ii. The Haus der Seidenkultur focuses on traditional silk-weaving. The Musée des Arts et Métiers in Paris looks into glass-blowing, glass-blowers and glass objects.

Mingei takes a new stance in evaluation and impact assessment. In addition to more traditional and standard utility-usability and user experience evaluation, we introduce the concept of evaluation and impact assessment to institutions, organisations, Cultural Heritage professionals and other stakeholders throughout the full life-cycle of the project. Most importantly, rather than focusing on the end-technology or result, we introduce the concept of organisational learning: mingei has set to also explore how research and heritage institutions and organisations learn and get altered as a result of deploying the digital and collaborating in digitizing heritage crafts. For that, we use various models and methods (e.g. Team Based Inquiry, Generic Learning Outcomes. etc). We report on what the process has so far given and how heritage and technology partners have evolved and learned during the first stages of the project.

# Keynote Speech

14:30 - 15:30

14:30 - 15:30

## Realistic Humans in Virtual Cultural Heritage

Alan Chalmers<sup>1</sup>

<sup>1</sup>University of Warwick, WMG, United Kingdom

The presence of people plays a key role in how an environment, both now and in the past, is perceived. While there have been numerous computer re-constructions of cultural heritage sites, many, if not most, of these do not contain people. One reason for this is the so called “uncanny valley” affect. Despite huge efforts to create highly realistic looking virtual humans, be-cause we humans have evolved to fully recognise other humans with all our imperfections, computer representations never look “quite right”. This has can have a significant negative impact on how we perceive a virtual environment, despite all the efforts to accurately simulate the past. This paper investigates the inclusion of real humans in virtual cultural heritage applications. These humans are captured in 3D in ancient costumes and re-enacting relevant tasks. Care is taken to ensure that the lighting during the real capture and the lighting in the virtual environment match. The results of this approach are demonstrated for a number of ancient industries in a reconstruction of medieval Coventry.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

### Bio Note:



Alan Chalmers is a Professor of Visualisation at WMG, University of Warwick, UK and a former Royal Society Industrial Fellow. He has an MSc with distinction from Rhodes University, 1985 and a PhD from University of Bristol, 1991. He is Honorary President of Afrigraph and a former Vice President of ACM SIGGRAPH. Chalmers has published over 250 papers in journals and international conferences on virtual archaeology, HDR imaging, high-fidelity virtual experiences, and multi-sensory perception, and successfully supervised 49 PhD students. In addition, Chalmers is a UK representative on IST/37 considering standards within MPEG and a Town Councillor for Kenilworth where he lives.

# Mixed Reality in Museums and Heritage Sites

16:00 - 17:30

Chair: Paul Marty  
Florida State University

## Cultural Heritage Documentation: the case study of the Ottoman Bath in Apollonia, Greece

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This paper presents a cutting-edge application, “Mergin’Mode” (<https://merginmode.com/>), with-in the context of its first pilot implementation of a project pertaining to the visual documentation and reconstruction of a specific cultural heritage building from the Ottoman era. Prior to this, it presents the primary mapping techniques and provides a comparative analysis and a benchmarking based on features that are considered critical in the cases of Cultural Heritage (CH) sites digital documentation. The ability of “Mergin’Mode” to represent monuments by merging their actual image with a detailed and accurate virtual reconstruction of their initial condition, overlaid with the use of Mixed Reality (MR) is demonstrated. Moreover, the archaeological characteristics of the specific site, as well as background information on the technologies employed and the documentation protocols are provided. The application, which relies on Geoinformation technologies, is able to provide stunning on-site MR experiences by combining state-of-the-art digital recording technologies (mainly Photogrammetry and laser scanning), input from archaeologists and other specialists. The case study of the reconstruction and representation of an Ottoman Bath in Apollonia, Greece is presented, after the provision of background knowledge and context, giving a description of the technical processes involved in the pilot implementation of “Mergin’Mode”. The architecture of “Mergin’Mode” in terms of the components it is comprised of as well as the characteristics of its authoring tool are outlined, giving a glimpse of the applications’ vast ability to adapt, expand and provide meaningful, exhilarating and informative experiences to on-site (or remote) visitors. “Mergin’Mode” is presented as an example of a cutting-edge application that brings to life archaeological sites combining the actual with the virtual, present, and past, incorporates multimodal contents, and thereby adds value to the visits of CH sites.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

## Visiting a Virtual Acropolis on the Immersive Web

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Recent developments in AR and VR (now merged as XR) promise to expand the range of applications in cultural heritage and the size of the potential audience. Standards are being defined to deliver XR on browsers on mobile devices and computers as well as headsets. WebXR will open AR and VR experience design to a larger group of developers with Webapp skills, and this "immersive web" can then become an extension of the current World Wide Web. WebXR "conferencing" technology can provide shared experiences for users and the potential for "live" virtual tours and classes for a larger audience on the web. WebXR can facilitate the development of cultural heritage "mirror-worlds" (3D renderings of heritage sites) that can be presented in a variety of modes to professional scholars, casual visitors, and tourists in situ.

To demonstrate what multi-person WebXR can offer, we are developing a prototype experience centered on the Athenian Acropolis. We have created a 3D model in moderate detail of the Parthenon and other buildings that can be deployed in WebXR, including in Hubs, Mozilla's conferencing environment (<https://hub.link/BpudZsn>). Users access a Hubs "room" on their browser on a recent mobile phone, computer, or headset. They can then tour the Acropolis model, including the interior of the Parthenon with a replica of the Athena Parthenos. Several visitors can be in the hall at one time and can text or speak to one another. A class of students could tour this virtual Acropolis with a knowledgeable guide. A VR tour of the Acropolis (or any similar heritage site) can serve as preparation for the experience of the actual visit. The conferencing feature also facilitates discussion of the experience after the actual visit. Because the environment runs on mobile devices, it can also be used for a "situated simulation" while visitors are at the site. In the case of the Acropolis, visitors can compare the current architectural remains to the model with the buildings intact. Situated simulation is one response to the problem of the center and periphery: providing links between what the visitor can see or experience inside a museum and what he or she sees at the site itself (Liestøl & Hadjidaki 2019; Liestøl 2014; Liestøl and Morrison 2013).

### References:

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- Liestøl, G., & Morrison, A. (2013). Views, alignment and incongruity in indirect augmented reality. 2013 IEEE International Symposium on Mixed and Augmented Reality - Arts, Media, and Humanities (ISMAR-AMH), 23–28.



## Augmented Reality for urban cultural heritage experiences: Lessons of a partly failed application.

Maria Engberg<sup>1</sup>

<sup>1</sup>Malmö university, Department of Computer Science and Media Technology, Sweden

In recent years design with augmented reality applications for cultural heritage purposes have increased and their usefulness for informal learning and tourist experiences is improving (Haugstvedt and Krogstie, 2012; Liestøl 2014). However, there are still significant challenges with using Augmented Reality technology for cultural heritage applications in open urban environments using GPS location. Even if the potential for rich experiences is great, the continued lack of precision of available GPS location and direction in smart phones create particular challenges for the interaction and experience design. This paper presents the experiences from a project that underwent several iterations in 2017 and 2018, using mobile Augmented Reality and 360 panoramic photography in a mobile application that foregrounded historical narratives in urban heritage environments. Specifically, the narratives were about the colonial past in the Danish capital Copenhagen, a past whose traces are still present in the architecture and history of noted places such as the famous Tivoli in the city as well as in archives and museums. This contested and fragmented colonial past live in digital archives that require design and exhibition practices in order to find their way to a larger audience.

Our project Finding Alberta was one such intervention. The extended reality (XR) web-based application, using a now depreciated platform called Argon (Speiginer et al 2015) but which was created using web programming and therefore is transferable, was part of a larger set of experiences, workshops and installations that brought to life black persons who were once taken to Denmark from the Virgin Islands, then under Danish rule. The point of the urban AR experience was to let the visitor follow in the footsteps of two children - Victor and Alberta - in order to better comprehend their lives and ultimately their fate in Denmark, from the human exhibition to early death of Alberta in 1917. However, the difficulty of properly leading visitors to GPS points and understand fully in what directions they are facing once they reach those points proved a design challenge that we were only partially able to successfully work around. This paper presents some of the design choices we made in order to still create a compelling experience while working around the limits of the affordances of mobile AR.

### References:

- Haugstvedt, A.-C., & Krogstie, J. (2012). Mobile Augmented Reality for Cultural Heritage: A Technology Acceptance Study. Paper presented at the IEEE International Symposium on Mixed and Augmented Reality, Atlanta, Georgia.
- Liestøl, G. (2014). Along the Appian Way. Storytelling and Memory across Time and Space in Mobile Augmented Reality. Paper presented at the Progress in Cultural Heritage. Documentation, Preservation, and Protection 5th International Conference, EuroMed 2014, Limassol, Cyprus.
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## XR checklist - what to consider when extending heritage

Roberta Bertini Viégas<sup>1, 2</sup>

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<sup>2</sup>Netherlands Institute for Sound and Vision, Research Intern, Netherlands

In this paper, I present and discuss a newly developed checklist. This checklist is constructed to facilitate heritage professionals in making sound choices when considering the use of extended reality (XR) technologies. Heritage institutions have been experimenting with XR technologies such as VR, AR and MR, for over a decade. Still, these technologies are primarily perceived by many as a novelty due to their lack of ubiquity in our daily lives. The idea of XR in heritage contexts is usually received with enthusiasm by audiences and with concerns by academics. Stuck in the middle between theory and result, heritage professionals are expected to provide “theoretically informed practice” as well as “practice-based theory” (Meijer-van Mensch & van Mensch, 2015).

Most of the literature, between 2001 until 2019, concerning the use of XR in the heritage field, focus mainly on the technical constraints of XR. In contrast, this study looks at three heritage concepts to define specific aspects and possibilities that should be taken into account when considering the use of XR in heritage institutions. The first concept is authenticity and to what extent virtuality may conflict or not with the expected authenticity in the heritage field. The second is the experience economy since XR is immediately associated with experiencing, my interest lies in exploring if it has the potential to surpass the experience and convey transformation. The third and final one is not one concept but a collection of trends present in the current international museological professional discourse.

These three concepts form the basis of the research into the use of extended reality in a hundred fifty heritage institutions worldwide from 2010 to 2020. This paper discusses the quantitative and qualitative methods that were applied to (1) create an overview of how such institutions have been using these technologies, enabling measurement, categorization and patterns identification; and (2) to contextualize, interpret and gain insight on the uses, possibilities and challenges of XR in such environments.

In this paper I will present the key findings of this research that are grouped into five intertwined themes: purpose (identifying mission, goal, target audience, expectations and relevance, most common as well as unexpected uses), user experience (levels of isolation and interaction, engaging senses, pre and post-experience), technology (choosing one or more, challenges, benefits and devices), management and design (finances, space, staff, hygiene and time), and a museological framework.

The result, as presented in this paper, is a checklist that is more than a reminder of relevant questions to be asked when considering XR in the heritage field. It is a tool that provides answers and insights based on in-depth researched cases from within the field. The checklist will be made available for use as an integral part of the website of the Netherlands Institute for Sound and Vision.

### References:

Meijer-van Mensch, L. & van Mensch, P. (2015). New trends in museology II. Muzej novejsje zgodovine.

# Emerging Technologies, Difficult Heritage and Affective Practices

16:00 - 17:30

Chair: Hannah Turner  
University of British Columbia

16:00 - 16:15

## Emerging Technologies and the Advent of the Holocaust “Hologram”

Cayo Gamber<sup>1</sup>

<sup>1</sup>The George Washington University, the University Writing Program, United States

At various sites, from the United Nations to the Dallas Holocaust Museum, hologram-like recordings introduce audiences to Holocaust survivors, survivors who soon no longer will be with us. This emerging technology to create Holocaust survivor “holograms” is employed to ensure that survivors’ histories will “live.” These video recordings of survivors not only are prepared to answer 1,000 possible questions, over time, they have the ability to refine “their” answers to those questions by learning to better understand what is being asked and providing the best answer in their repository. Moreover, while these recordings currently are not holograms, they have been created in such a way that when that technology is available – that is when their current 2D projection can be altered into a 3D image – they can be adapted accordingly. Most importantly, this technology has been employed in order to create ongoing interactions between survivors and the general public. Members of the public who “visit with” the video recordings are able to interact by engaging in a conversation that the visitors themselves direct by asking the questions they most want answered. In this interactive process, a testimonial alliance is created between the interlocutors who ask and that the survivor recording who responds.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

16:15 - 16:30

## The Atlas of Lost Rooms: Digitally Reconstructing Dark Heritage Sites in Ireland

Chris Hamill<sup>1</sup>

<sup>1</sup>Queen's University Belfast, Architecture, United Kingdom

This paper explores the use of 3D digital reconstructions of dark heritage sites (defined as sites associated with death, injury, injustice, abuse and torture) for architectural investigations and public dissemination of difficult and emotionally challenging historic events.

The particular case study examined is the ongoing Atlas of Lost Rooms project (<http://atlasoflostrooms.com/>), a digital reconstruction of the Sean MacDermott St Magdalene Laundry in Dublin, one of Ireland’s most poignant sites of institutional abuse. The project seeks to create a repository of oral histories from the now demolished laundry complex, using

digital architectural modelling to situate survivor testimony within an online model of the former site.

The paper explores the theoretical justification for the use of digital technologies in examining dark heritage sites, and sets out a workflow for how 3D reconstructions can be created from limited and fragmentary sources, and how such processes can be a valuable architectural research methodology. The paper concludes by suggesting future areas for further study to determine the usefulness of digital tools in the field of dark and contested heritage.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

16:30 - 16:45

## Tangible and Embodied Interaction for Scaffolding Difficult Heritage Narratives

Arete Damala<sup>1</sup>

<sup>1</sup>Centre national de la recherche scientifique (CNRS), France

“Atlantic Wall, War in the City of Peace” was a temporary exhibition on display in Museon, The Hague in 2015. The exhibition visited the story of the city of the Hague in World War 2, when a large part of the city had to be demolished, to make space for the Atlantic Wall. Hundreds of people were evicted from their houses. The exhibition had multiple, non-linear entry points, with exhibition sections corresponding neighbourhoods in the Hague. In each section, various objects on display served as entry points for different, first-person, narratives entwined around a particular neighbourhood. In addition to seeing the exhibited objects, the visitors had the possibility to activate different audio narratives, corresponding to three different perspectives, using smart, 3D printed replicas: the perspective of the German soldier, the perspective of the Dutch civilian, or the perspective of the Dutch civil servant. This paper presents an overview of the key-findings from a survey that was filled in by 88 participants. The survey was part of a mixed methods evaluation study which occurred in Museon throughout a period of two weeks.

\*The full paper can be found in the RISE IMET proceedings

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## Dimensions in Testimony: Affect, Holograms and New Curatorial Challenges

Elena Stylianou<sup>1</sup>

<sup>1</sup>European University Cyprus, Department of Art / School of Humanities, Social and Education Sciences, Cyprus

"Emotions were so raw...If I could have hugged Fritzie's hologram, I would have. Her story will stay with me the rest of my life..." Late in 2018 the new multimillion dollar interactive "Take a Stance Center" opened at the Illinois Holocaust Museum. It uses 3D holography and recordings of Holocaust survivors, who are then presented on the Interactive Survivor Stories Experience theater – featuring "Dimensions in Testimony" - discussing their experiences and answering questions from the audience using voice recognition technology in a simulated conversation. Thirteen Holocaust survivors joined together to make this permanent exhibition a reality; seven from the local Chicagoland area around the museum.

In this paper, "Take a Stance" will be approached as a case study and will serve as the starting point for discussing the potential of current technologies to offer a new curatorial approach to contested histories in museums. More specifically, the paper will draw on Deleuze and Massumi's theories to argue that exhibitions could become a virtual space for embodiment with history, and in that way, exhibitions can be political: they trigger affect, empathy and a desire for social change. This notion of the political is here linked to: a) technology's potential to dismantle hierarchies and open the space for more discursive and creative engagement with objects and narratives; b) the ways in which visitors' engagement, facilitated by technological interventions, can lead to an active and critical participation to the construction of meaning in a manner that could ultimately inspire change; and c) the idea that participation and engagement might be the only means of blocking any sensationalist exploitation of death, violence and suffering that could ultimately re-victimize the victim (a common characteristic in exhibitions that negotiate difficult histories).

In the case of "Take a Stance", the question, thus, becomes on the one hand, about technology's potential to open up the space for visitors' agency and critical involvement with the histories it narrates and to broaden the museum's existing narratives about the Holocaust. On the other hand, it is about whether technology is in danger of becoming another example of excessive mediation of trauma caused by the personal account of the thirteen survivors. At times when materiality in museums gained anew significance in debates about affect, virtual technologies like the ones used in "Take a Stance" offer a new form of materiality: although you cannot touch the survivors, the 3D virtual holographic reconstructions still give the illusion of a very real – even traumatic – personal encounter. Certainly, the degree to which technology's virtual materiality is able to trigger emotional and visceral responses is difficult to assess. It does confirm though, a museological approach to curatorship that acknowledges the significance of proximity to the "original" object/experience/personal account. Essentially, "Take a Stance" could serve as example to further explore how the employment of virtual technologies could revise curatorial storytelling, as well as the authorial voice, by challenging existing narrative devices, negotiating collectivity and difference through affect, and transforming exhibitions into spaces of political agency.

Friday, 04 June

## Oral Presentations

10:30 - 11:30 Keynote Speech: Mixing visual media for Cultural Heritage

12:00 - 13:30 Explorations on Digital Ethics, Inclusiveness and Authenticity

Digital Heritage and Virtual Museums: New Approaches and Challenges

14:30 - 15:45 Digitization, Documentation and Digital Representation of Cultural Heritage

14:30 - 16:00 Workshop



# Keynote Speech

10:30 - 11:30

10:30 - 11:30

## Mixing visual media for Cultural Heritage

Roberto Scopigno<sup>1</sup>

<sup>1</sup>ISTI-CNR, Pisa, Italy

The Cultural Heritage (CH) domain is a field where many different visual media are constituent elements of the main activities: study, conservation, dissemination, and presentation to the public (museum visitors, tourists, practitioners). Those media are usually used in isolation, adopting specific visualization tools. This paper aims to review several experiences where multiple visual media have been used in a coordinated manner by fusing or presenting them in the same visualization context. These approaches experimented with new interaction and visualization methodologies, able to use different media in a synergic way. CH domain is an ideal field of experimentation of the potential of media integration. We comprehend that using multiple media can improve insight capability. We guide the reader in the analysis of some pioneering experiences and approaches. A final discussion tries to highlight the work needed for a wider acceptance and impact of those approaches.

\*The full paper can be found in the RISE IMET proceedings

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### Bio Note:



Roberto Scopigno graduated on Computer Science at Pisa in 1984. He is a Research Director with CNR-ISTI and founder of the Visual Computing Lab. Since 2019 Roberto has been nominated Director of CNR-ISTI. He has been engaged in research projects concerned with 3D graphics and visual technologies (interactive visualisation, multi-resolution technologies, 3D digitization) with main application to Cultural Heritage. He published more than 250 papers in international journals or conferences, with Google Scholar h-index 53. Roberto has been responsible person for CNR-ISTI for several EU projects and ICP Co-Chair of several international conferences. He served as Chair of the Eurographics Association (2009-2010), Editor in Chief of the Int. Journal Computer Graphics Forum (2001-2010) and member of the ERC PE6 panel (ICT panel); he is Editor in Chief of the ACM J. on Computing and Cultural Heritage. He has been the recipient of the "Outstanding Technical Contribution Award" issued by the Eurographics Association in 2008 and of the "Distinguished Career Award" issued by Eurographics in 2014.

# Explorations on Digital Ethics, Inclusiveness and Authenticity

12:00 - 13:30

Chair: Antigone Heraclidou  
CYENS Centre of Excellence

## Interactions for everybody!? On creating inclusive technologies and the generative potential of disability

Nicole Schimkus<sup>1</sup>

<sup>1</sup>University of Potsdam, Media Science, Germany

Interactive technologies, like augmented and virtual reality, serious games and artificial intelligence, are becoming more and more interlinked with the visitor's experience of cultural heritage. The rise of human-machine-interactions in museums and heritage sites opens up a wide range of new possibilities to make their collections and contents more accessible to everybody. But what does accessibility entail? And who is everybody?

Creators and museum professionals need to be aware that new technologies carry within themselves the potential for sociocultural inclusion and exclusion alike. Even the most innovative current technologies may still presume able-bodiedness, favor certain sensory perceptions over others and interactions with them will most likely rely on visual cues. This means, by design, a large number of people with and without disabilities will not be able to use those technologies without assistance or maybe even at all.

New technologies have often been promoted as a panacea for problems in developing inclusive interactions. But accessibility and inclusion do not result naturally out of technological innovation. There is a big need for new methodologies when it comes to the development and design of inclusive interactive technologies: starting with introducing participatory approaches to the creation processes, privileging multimodal interactions and the conscious dismantling of visual dominance.

Creating interactions with cultural heritage for everybody doesn't need to mean focussing on restrictions. There is an inherently generative potential in attending to various disabilities. Disability can be understood as narrative, epistemic, and ethical resource for inclusive world building, as Rosemarie Garland-Thomson (2017) put it. For example: putting in ramps at the entrances of museums to accommodate people in wheelchairs has turned out to be useful for families with buggies. Using bigger fonts and strong color contrasts to accommodate people with visual impairments is known to have improved the overall orientation in museums. There are many examples where considering the needs of people with disabilities has brought on an improvement for "everybody".

A conference dedicated to the exploration of current practices in the use of emerging and interactive technologies should also consider who is invited and who is excluded by these practices. We have to ask ourselves: What are inclusive interactions with cultural heritage? What methods can we use to foster accessibility and inclusivity? How can we involve a more diverse group of people into the development/ design process? And finally, how can we move beyond the idea of granting access towards a more holistic approach to achieve inclusive experiences for all?

### Reference:

Garland Thomson, R. (2012, October). Building a world with disability in it. In Keynote paper presented at the Contact Zone: Disability, Culture, Theory conference, University of Cologne, Germany (pp. 25-27).

12:15 - 12:30

## Towards museum digital ethics: introducing, addressing, defining and measuring the Museum Digital Atmosphere

Sofia Paschou<sup>1</sup>, Georgios Papaioannou<sup>2</sup>

<sup>1</sup>Ionian University, Museology lab, Greece

<sup>2</sup>Ionian Universtiy, Museology lab, Greece

In today's large audience and digitality, museums seek not only for impressive and meaningful exhibits but also for visitors' perceptions, behaviors and entertainment. They care for enhancing visitors' experience and engagement via digital media such as virtual and augmented reality applications, museum websites, online exhibitions, virtual museums and museum's social media landscapes.

This paper introduces, explores and highlights the existence, the notion and the characteristics of "Museum Digital Atmosphere" (MDA) in Greek museums today, contributing to the debate on museum ethics in the digital world. By the term 'atmosphere' we mean the emotional mood caused by various factors along with the corresponding response of the public to them. The Museum Digital Atmosphere is a novel and hybrid term enriching museum ethics as element, adding towards shaping of digital museum ethics rules for managing new digital realities in museums. This paper discusses ways towards approaching the Museum Digital Atmosphere, which emerges as a measurable (and therefore manageable) element invoking and using ethical rules. Its measurability is addressed via our work on a set of recently-developed research methods and approaches, including observations, content analysis, museum Big Data mining and SOR model applications. This work is presented here.

Addressing the Museum Digital Atmosphere and given the lack of explicit reference to digital ethics in the current museum code of ethics, this paper aims to stimulate discussion towards the need to establish ethical issues, boundaries, attributes and attitudes adjusted to museums' 21st-century digital realities, while examining current museum practices in the digital world.

12:30 - 12:45

## Ethical Considerations and Methods for Diversifying Representations of Cultural Heritage: A Case Example of the Swayambhu UNESCO World Heritage Site in Nepal

Bhikshuni Lozang Trinlae<sup>1</sup>

<sup>1</sup>University of Tartu, School of Theology and Religious Studies, Estonia

The Swayambhu (Svayambhū) UNESCO heritage site in Nepal has recently recovered from extensive earthquake damage. It serves as a social locus of ethnic and religious cultural heritage and identity for diverse local residents as well as domestic and international pilgrims and tourists. Here an applied case will be used to demonstrate processes necessary for producing an empirically authentic multimedia representation of an immersive experience

related to a daily community devotional singing event with its own unique grassroots heritage. This case will illustrate how systematic phenomenological, ethnographic, and text-based methods are used as data inputs for representing the authenticity of experiences by way of diverse forms of verbatim interview data and recorded primary sources. Technical attention to the design phases of applications of digital technologies for heritage sites will be addressed. Ethical considerations and methods for diversifying enfranchisement of voices and perspectives employed in representing living cultural heritage will be discussed. Benefits of using VR/AR-supported immersive experiences of heritage to enable cultural literacy, appreciation of alterity, civic harmony, and local economic vitality will also be detailed.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

12:45 - 13:00

## Development of Design Protocols in the Use of Virtual Reality for Cultural Heritage Representation

Gamaliel Domingo<sup>1</sup>

<sup>1</sup>De La Salle University - Manila, College of Liberal Arts, Department of Communication, Philippines

In the Philippines, there are currently no design protocols for appropriate cultural heritage representation using virtual reality. Hence, this study collated inputs from literature concerning the concepts of Authenticity and Aura; the factors affecting heritage representation; and lastly, the solicited views from connoisseurs through focus group discussions, interviews and content analysis of their historical VR projects. Results of the study found that Authenticity and Aura can be conceptualised in non-materials terms through Mode of Production, Authorship, Ownership, and Performance. These understandings may help resolve issues related to historical accuracy of representing cultural heritage objects.

\*The full paper can be found in the RISE IMET proceedings

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# Digital Heritage and Virtual Museums: New Approaches and Challenges

12:00 - 13:30

Chair: Doros Polydrou  
Cyprus University of Technology

## Fusing Virtual Reality, Robots and Social Networking Technologies to Build the Virtual Museum of the Future: Towards a New Type of Community Based Cyber-Physical-Social Eco-System.

Lyuba Alboul<sup>1</sup>, Louis Nisiotis<sup>2</sup>, Martin Beer<sup>3</sup>

<sup>1</sup>Sheffield Hallam University, Department of Engineering and Mathematics / Centre for Automation and Robotics Research, United Kingdom

<sup>2</sup>UCLan University Cyprus, School of Sciences, Cyprus

<sup>3</sup>Sheffield Hallam University, Department of Computing, United Kingdom

Cultural Heritage is an important part of our eco-system, a window into our past and our future. Museums aim at helping visitors understand information regarding a topic or event in history using artefacts and/or multimedia interactions. However, displaying exhibits in glass cabinets, use audio guides, leaflets or guidebooks are not enough to engage visitors who are now exposed to modern entertainment technologies such as social networks, smartphones, IoT, visual games etc. Therefore, overcoming the outdated principles of traditional museology is crucial to develop new methods of engaging visitors, maintain visitor flow and consumer satisfaction to avoid the cultural and financial implications of lower visitor numbers (Alboul et al, 2019a). To respond to this change, different technologies have been utilised over the years in museums to attract, engage and retain visitors, for instance VR, AR, Robots, sensors, etc. introducing the concept of a Virtual Museum (Nisiotis et al, 2019). Especially using VR and Robots, there have been some very successful attempts in graphics and visualisation, remote attendance and robotic teleoperation. However, going beyond these topics, the opportunities offered by VR and Robots to blend realities when combined with Social Networking to establish communication, develop individual user profiles, and to merge remote with physical users through multilinked environments are yet to be explored (Alboul et al, 2019b).

This paper presents the development of a new type of community based Cyber-Physical-Social Eco-System (CPSeS) that would seamlessly blend the real with virtual worlds interactively using a fusion of VR, Robots and Social Networking technologies to support Cultural Heritage. This CPSeS will be including real and artificial agents and elements capable of dynamically interacting, reflecting and influencing each other with the interactions engendered by humans and their behavior. This system aims at creating new approaches not only to protect Cultural Heritage sites and make them available for a wide range of public, but to also create a CPSeS that will allow visitors to connect to events, spaces, or phenomena, separated either in time or in space or both.

To investigate this, the development of a Virtual Museum prototype featuring the History of Robotics is underway as a case study. This is a multi-user environment that comprises Robots and their corresponding virtual avatars that link the physical with the virtual world, where users can experience using their personal smartphone and low-cost VR head mounted displays. Future work is under way to implement more agents, social networking technology and additional novel functionalities. The developed system will be also applicable to other socio-spatial domains.



## References:

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12:15 - 12:30

## Virtual Dance Museums: the case of Cypriot folk dancing

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Cyprus, as an island in the crossroad of three continents, is rich in history and cultural heritage. Over the last decade, and due to the recent technological advances, a significant amount of effort has been devoted to digitize, document, preserve, and protect mostly tangible cultural heritage creations. However, apart from tangible artifacts, cultural heritage also encompasses a range of important assets that includes collective knowledge of skills, practices, expressions, art, fashion, and others that do not have a tangible form. These intangible creations are the mainspring of humanity's cultural diversity, and its maintenance is a guarantee for continuing creativity. In this work we focus on folk dancing, one of the most important aspects of intangible cultural heritage. Folk dances usually produce a meaning, a story with the help of music, costumes and moves, reflecting the socio-cultural and political peculiarities of each nation. Folk dancing though is in high risk due to wars, the moving of populations, the economic crisis, but most importantly, because these fragile creations are modified over time through the process of collective recreation, and/or changes in the way of life.

In this work we use emerging technology, to digitize, analyze, and holistically document our intangible heritage creations. We have developed methodologies for low-cost optical motion capture, and techniques for reliable pose reconstruction of complex and dynamic motions. Building on our dance library (Stavrakis et al. 2012), we have employed a relational schema to holistically structure the information within the database, that is useful for archiving, curating, presenting, further analyzing, and re-using dance motion data. We have also devised a novel method for contextual motion analysis that organizes dance data semantically (Aristidou et al. 2019). The method is capable of exploiting the correlation between dances, indexing and retrieving similar motions from large datasets (without the need of manual labelling and annotation) that are time-scale and temporal order invariant, a key feature when working with dances. As follows, we have portrayed the chronological and geographical evolution of dance, and unveil cultural similarities between dances of neighbouring countries, establishing the first digital dance ethnography. Currently, we are in the process of building a highly immersive Augmented Reality platform that paves the way for an intuitive and interactive virtual dance museum. We aim to provide the technological tools

that allow to widely educate the public about the story, costumes, music, and history of our dance heritage. We will develop a Mixed Reality framework that enables the user to interact with the platform using audio, gesture and/or voice control. Dancing and metadata will be depicted using advanced 3D character visualization, while motion analysis will be used to facilitate dance learning applications through gamification (Aristidou et al. 2015).

#### References:

- Aristidou et al. 2015. Emotion analysis and classification: Understanding the performers' emotions using LMA entities. *Computer Graphics Forum*, 34(6), 262–276.
- Aristidou et al. 2019. Digital Dance Ethnography: Organizing Large Dance Collections. *ACM J. Comp. Cultural Heritage*, 12(4).
- Stavrakis et al. 2012. Digitization of Cypriot Folk Dances. *International Conference on Progress in Cultural Heritage Preservation*. Springer-Verlag.

12:30 - 12:45

## An exploration on the quality of Cultural Heritage Communication in Digital Environments

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Communication of cultural heritage through digital environments is a relatively new phenomenon, unlike the time-tested and successful pre-digital methods of communication like books, paintings, monuments, and stories told through performing arts or folktales. Exploring the capabilities of these recent methods and technologies in providing quality Cultural Heritage Communication (CHComm) is suitable to give us insights on the achievement of the intended communication goals. The quality of message in a Digital CHComm environment is especially important for the information to be received and interpreted especially for the current need of awareness about cultural heritage values and the tools that make the value transfer possible.

This positional presentation aims to establish the relevant definitions for Cultural Heritage Communication (CHComm) and understand the elements of CHComm within digital environments. Identifying the nuances in the quality of components can provide insights for the improvement of methods. Various methods of analysis are listed and briefly analysed below, and include analyses of interface components, senders, receivers, message content transfer and feedback. The exploratory methods suggested in the presentation are also being actively worked upon. The observations and inferences from these researches are to be validated through two test cases of digital environments at different scales. The presentation includes consideration criteria and early-stage findings on this research project. The roadmap of these studies into the quality of CHComm for digital environments is drawn to suggest a future scope of this research.

# Machine Learning and Museum Collections: A Data Conundrum

Lukas Noehrer<sup>1,2</sup>, Jonathan Carlton<sup>1</sup>, Caroline Jay<sup>1</sup>

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Museums contain vast amounts of information and knowledge, providing a vital source of engagement for diverse audiences. As society becomes ever more digital, museums are moving towards making their collections available online to the public. However, just providing a searchable interface to the entirety of the collection could be a barrier to successful engagement. Tremendous craftsmanship is put into creating interesting and informative in-person curations of selected items, and a challenge exists in replicating this online. One solution could be the application of recommender systems, which personalise information to the individual based on their previous interactions and tastes. These systems power many popular online services but cannot be applied without considerations and decisions being made about the data that is given to the engine. As museum collections vary in their nature and content, particular care should be taken when handling the data – standard methods may not apply. In this paper, we present the challenges of data curation in the context of using machine learning techniques with museum collections, supported by two case studies.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

# Digitization, Documentation and Digital Representation of Cultural Heritage

14:30 - 15:45

Chair: Andreas Lanitis

Cyprus University of Technology / CYENS Centre of Excellence

## Pioneering advanced recording technologies for post-earthquake-damage assessment and re-construction in Chilean heritage areas

Bernadette Devilat<sup>1</sup>

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Physical conservation of historic buildings is a challenge worldwide, but it is even more difficult in earthquake-prone areas. To avoid the potential damage, mitigation strategies are required, such as periodic maintenance, repair and strengthening, usually not implemented at the scale of dwellings in heritage areas. Funding is generally available for monumental buildings — such as churches — leaving the houses vulnerable to the effects of future earthquakes.

After earthquakes, damaged dwellings cannot be immediately reinforced to continue inhabitation; generating disruption. If buildings are repairable, the costs are high due to the difficulty to work with the existing remains, resulting in the preference for new constructions on-site and elsewhere. Large numbers of affected constructions make damage assessment difficult, impacting in slow and some-times out-of-context responses.

This paper proposes an alternative to tackle these issues by using 3D-laser-scanning—to document the as-built condition of houses after the 2010 earthquake in Lolol, a heritage village in Chile which was in progress of reconstruction and repair via the newly created Heritage Reconstruction Programme post-earthquake. The data obtained was used as a basis for design the architectural interventions required, with the potential of speeding up emergency responses and retrofits, leading to the re-use of the built heritage left. From this, I also argue to introduce technology institutionally at a governmental level, to inform a more sustainable, affordable and inclusive method for risk mitigation, repair and re-construction of domestic heritage in seismic-prone areas of Chile, which is also relevant for similar cases worldwide.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

14:45 - 15:00

## Formalization of the “Immaterial Features” Conveyed by the Iconographic Cultural Heritage Entities

Gian Piero Zarri<sup>1</sup>

<sup>1</sup>Sorbonne University, STIH Laboratory, France

The “digitization practices” used up-to-now to produce digital counterparts of the iconographic Cultural Heritage entities – paintings, drawings, frescoes murals etc. – have mainly focused on the “physical” (dimensions, materials, supports, painting etc. techniques, locations, provenance...) aspects of these entities. This means that all the “immaterial features” that characterize these items – from the stories/narratives they tell to all sort of feelings, memories, evocations and aesthetic experiences they can evoke in their end-users – are largely neglected. This paper argues that, to take correctly these immaterial aspects into account, we must have at our disposal particularly powerful and expressive knowledge representation systems. Given their reduced expressiveness possibilities, “standard” systems like the Semantic Web tools can difficulty fit the bill. In this context, the paper presents and discusses then in some detail the formal representations, obtained using the NKRL’s (Narrative Knowledge Representation Language) tools, of complex iconographic situations that characterize two masterpieces of the Renaissance period. The results obtained, even if they are very preliminary, show that NKRL should be borne in mind as a possible useful tool for properly representing in digital format the “immaterial features” mentioned above.

\*The full paper can be found in the RISE IMET proceedings

Shehade, M. and Stylianou-Lambert, T. (eds), 2021 (forthcoming), *Emerging Technologies and the Digital Transformation of Museums and Heritage Sites*, Proceedings of the 1<sup>st</sup> RISE IMET conference, 2-4 June 2021, Springer.

15:00 - 15:15

## On the new application of the photogrammetric method for the task of digitizing an object wave of a display full-color hologram

Anastasia Timoshenkova<sup>1</sup>, Nikolay Balbekin<sup>2</sup>, Tatyana Shlykova<sup>1</sup>, Nickolay Petrov<sup>2</sup>, Ekaterina Rabosh<sup>3</sup>

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In this paper, an approach to archival storage of information about cultural heritage objects is considered by recording information about their texture in the form of analog display full-color holograms, which, on the one hand, have visual aesthetics, and on the other hand, information capacity that surpasses existing analogs of media. At present, there are no technologies for

digitizing the information contained in display holograms that would make it possible to effectively use the data about an object. It is shown that information about the shape of an object can be digitized using the photogrammetry technique. The requirements for both the recording of an image hologram and the installation

for photogrammetric shooting are analyzed. To demonstrate the developed technology based on a combination of holographic and photogrammetric techniques, a ceramic vase 10 cm high was chosen, the surface of which diffusely scatters light. An analog full-color hologram was recorded by the method of Yu. N. Denisyuk.

To observe the object encoded in the hologram, chemical-photographic post-processing was carried out. To reconstruct the reference wavefront, a point source of white scattered light was used, directed to the normal of the photographic plate at the same angle at which the hologram was recorded. For direct digitization of information, a photograph of a hologram with a coverage angle of 120 degrees was carried out. Agisoft Metashape was used as a software package for processing a series of photographs. The work describes in detail the process of constructing three-dimensional models of an object and holograms.

The performed analysis and the obtained experimental results showed that the proposed approach is promising if the necessary conditions for recording reflective holograms are met and the image is reconstructed from them by a point source of white light.

# Workshop

14:30 - 16:00



## Revisiting what is on offer: nourishing blended inquiry learning in the galleries and beyond

Stamatina Anastopoulou<sup>1</sup>, Giasemi Vavoula<sup>1</sup>, Torhild Skåtun<sup>2</sup>

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When young people go to a science centre as part of a school visit, they can be very engaged with the interactive exhibits. They are called to 'find out for themselves' through playing with exhibits. While turning a dial, lifting a lever, or rolling a wheel increase the interactivity of the science centre experience, and thereby increase enjoyment, it is unclear much science visitors actually learn during the visit. This is still a challenge for science museums and science centres (Bell et al., 2009) and this workshop will address it by proposing a methodology for generating creative ideas for school visit activities that are both hands-on and minds-on. Our aim is to bring together professionals from diverse fields to co-design activities for learning science within museums. Fostering interdisciplinary dialogue between academics and practitioners, this methodology will offer a useful toolkit for participants to tailor to their own circumstances.

Science learning will be facilitated through various forms of inquiry learning, where visitors act like scientists (Scanlon et al., 2012) by looking for evidence, understanding the underlying principles and communicating them. Workshop participants will work in groups to share and discuss how inquiry learning activities can be designed and offered in a blended learning environment. Blended learning refers to a combination of face-to-face and online activities that can take place during the school visit, before or after it. Participant interactions will be supported by the Value Proposition Canvas (Osterwalder et al., 2014), a human-centred design tool that connects visitor needs with the science centre offer. It is a visual framework for establishing concrete answers to questions like 'what difference do we make with this exhibit/programme/service and to whom?' It addresses specific visitor 'pains' or problems and offers them 'gains' by meeting their needs. The Value Proposition Canvas will be used to explore the value of inquiry activities for science centre visitors, during and after the visit.

This workshop will offer to participants a methodology for designing visitor activities for blended learning approaches in science museums. Participants will be able to tailor this methodology to their individual circumstances.

### References:

- Bell, P., Lewenstein, B., Shouse, A., & Feder, M. A. (2009). *Learning sciences in informal environments: People, places and pursuits*. Washington, DC: National Academies Press.
- Scanlon, E., Anastopoulou, S., Kerawalla, L., Mulholland, P. (2011). How technology resources can be used to represent personal inquiry and support students' understanding of it across contexts. *Journal of Computer Assisted Learning* Vol. 27(6), pages 516–529.
- Osterwalder, A.; Pigneur, Y.; Bernarda, G.; Smith, A. *Value Proposition Design: How to Create Products and Services Customers Want*; JohnWiley and Sons: Hoboken, NJ, USA, 2014.



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