



Gorffennol Digidol Digital Past - 2021

New Technologies in Heritage, Interpretation & Outreach

Wednesday 10 February 2021: Conference

Online via Zoom

Abstracts

Royal Commission on the Ancient and Historical
Monuments of Wales

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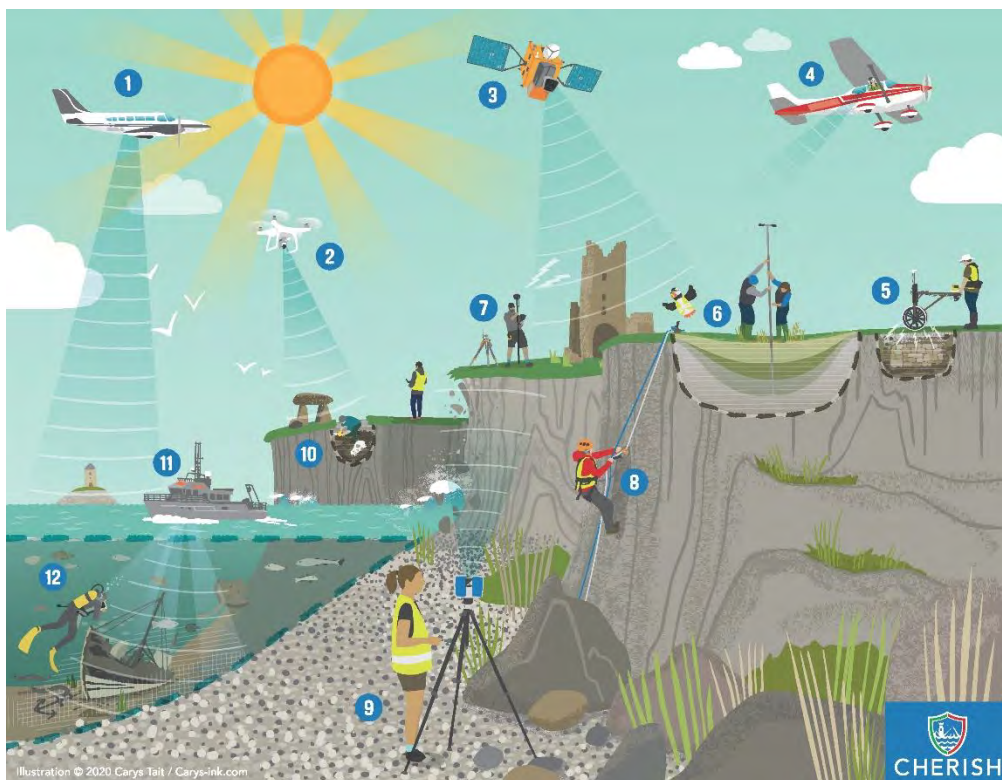
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DRONES, BOATS, LASERS AND ROPES.

Studying the Past, Present and Near Future Impacts of Climate Change on Coastal Heritage Sites and Landscapes in Wales and Ireland

Louise Barker, Senior Investigator and [CHERISH](#) project archaeologist, [RCAHMW](#)

Kieran Craven, Marine geoscientist and [CHERISH](#) project co-ordinator, [Geological Survey Ireland](#)



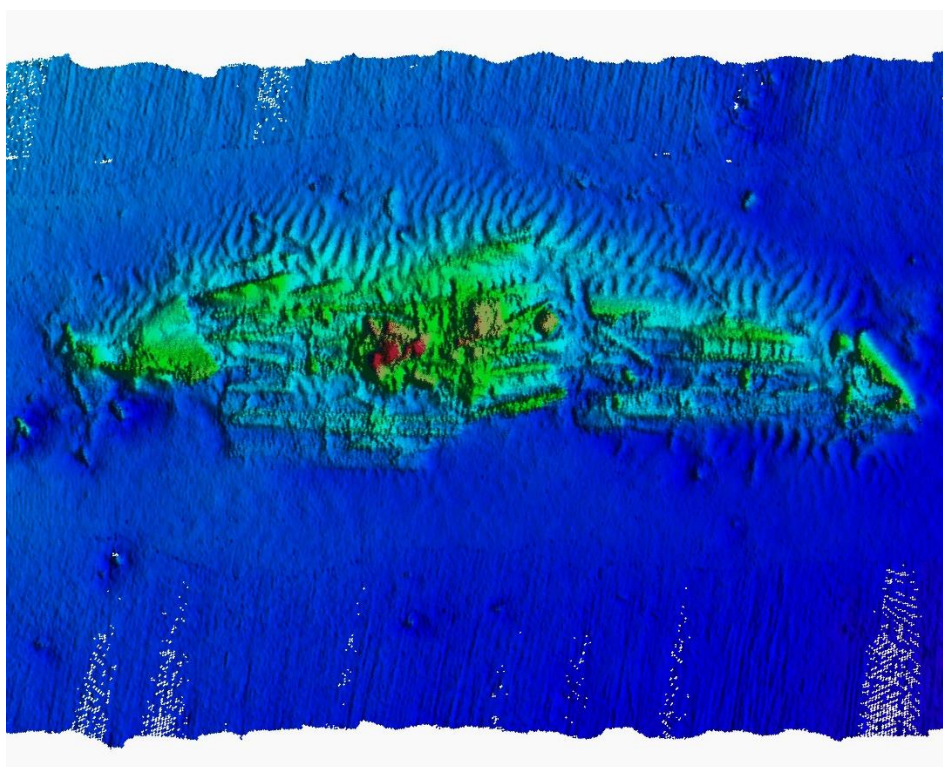
CHERISH toolkit (© 2020 Carys Tait / Carys-ink.com)

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Louise Barker of the Royal Commission and Dr Kieran Craven of Geological Survey Ireland will introduce the EU-Funded Ireland-Wales CHERISH – Climate Change and Coastal Heritage Project. This brings together a multidisciplinary team of archaeologists, geologists and environmental scientists using an integrated methodology of survey and investigation, to record and monitor the impacts of climate change at a network of coastal and maritime sites in Wales and Ireland.

CHERISH deploys unmanned aerial vehicles (UAVs), 3D scanning equipment and acoustic bathymetry to establish baseline data, creating digital products such as elevation models, orthoimages and 3D models to observe, map and predict change in dynamic coastal environments. Repeat monitoring of sites also enables the analysis and comparison of time-series datasets to quantify change. Digital data is also being used to raise public awareness of the impacts of climate change on coastal heritage, for example through the production of virtual tours of archaeological sites and 3D printed models.



SS Idaho (© Crown copyright. CHERISH project)

CHERISH is also undertaking archaeological investigation at threatened sites to improve our understanding and knowledge of them. Here we will showcase work at the eroding prehistoric coastal hillfort of Dinas Dinlle in Gwynedd, where in addition to digital monitoring surveys, investigative work has included archaeological survey, geophysical survey and excavation, both dangling from ropes over the cliff face and with local volunteers near the coast edge. This uncovered a remarkably well-preserved stone

roundhouse buried beneath deep sand deposits, thought to represent periods of past storminess. Luminescence dating of the sand deposits and palaeoenvironmental work in the surrounding landscape is helping us reconstruct the past environments and climate at the hillfort, providing a long-term context to current and future risks, as well as an insight into the nature of extremes faced by past communities.



Dinas Dinlle. (© Crown copyright. RCAHMW)

Biography

Louise Barker is a Senior Investigator with the Royal Commission on the Ancient and Historical Monuments of Wales and archaeologist on the CHERISH project.

She has worked as an archaeologist since graduating from Newcastle University in 1996, starting her career in contract archaeology before joining, what was then English Heritage in 1999 and subsequently the Royal Commission in 2004. Louise specialises in landscape survey and interpretation, and has worked on a wide range of sites and landscapes spanning prehistory to the present day.

Dr Kieran Craven is a marine geoscientist and the CHERISH project co-ordinator for the Geological Survey Ireland since July 2018. He graduated with a BSc in Geoscience and Environmental Biology from the University of St Andrews in 2006 and completed his PhD in Geology from Trinity College Dublin in 2013 investigating the impacts of sea-level rise on coastal environments. Kieran has worked as a lecturer in both Trinity College Dublin and Maynooth University, and with the INFOMAR programme of the Geological Survey, analysing acoustic technologies to interpret seabed and subsurface environments.



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DEMOCRATISING COMMUNITY ENGAGEMENT AND COLLECTIONS DEVELOPMENT THROUGH DIGITAL SKILL-SHARING

Drew Ellery, Digital Officer, [The Ahmed Iqbal Ullah RACE Centre and Education Trust](#)



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The Ahmed Iqbal Ullah RACE Centre and Education Trust have a symbiotic relationship. The Education Trust supports ethnically and culturally diverse community heritage projects, generating material (including publications, oral histories, creative material and donated papers) that are accessioned into the RACE Centre's archive collection. In turn, this archive material forms the basis of future outreach work.

The Coming In from Cold project has allowed us to work with many diverse and under-represented community groups, ensuring that they are equipped with training to digitise photographs and documents, record oral histories as well as curating digital content. This participatory model enables our groups to hold authority over the production and curation of their own digital material. As an outcome, our groups have used this training to produce engaging outputs for exhibitions, workshops, presentations and websites, ensuring that their stories are heard and that our archive (at Manchester Central Library) more accurately reflects the diversity of Greater Manchester.

I will share our holistic approach to community engagement and collection development and discuss how institutions might re-negotiate dynamics of power and control within an increasingly digital landscape.

Biography

Drew Ellery is the Digital Officer at the Ahmed Iqbal Ullah RACE Centre. He began his career as an Archives Trainee with the National Archives - Skills for the Future traineeship programme. His work focuses on using digitisation and digital technologies to increase access to archive collections at Manchester Central Library. He has recently completed an MA in Museum and Gallery Studies at the University of Manchester.



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REMAKING THE PAST

Changyu Diao and Zhirong Li, Vice Deans of Cultural Heritage Institute, [Zhejiang University, China](#)

We will outline the detailed method of reconstruction which used laser scanning and photogrammetry to produce precise geometric replication combined with high-resolution textures. This enabled a 1:1 cultural heritage replica, fabricated through 3D printing to a steel structure with chemical reinforcement and integrating colour replication through colour calibration, pigment analysis, management of light conditions and painting techniques. This use of these digital technologies aided issues around the repatriation of a cultural heritage asset and allowed for an exhibition of accurately replicated grottoes.

Biography

Changyu Diao and Zhirong Li are both the vice deans of the Cultural Heritage Institute of Zhejiang University, China. They lead a digital research and application team together for 10 years. They have engaged in cultural heritage digitization research, including 3D digitization, information management, information processing and analysis, virtual exhibition, digital museum, 3D printing, etc. Some of the research achievements represent the highest level of the related areas in China, which have been successfully applied to many sites and museums.



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HERITAGE ON THE EDGE:

The Role of Heritage in Increasing Global Climate Ambition and Action

**Will Megarry, Senior Lecturer in GIS and Archaeology, Queen's University Belfast;
ICOMOS Climate Change and Cultural Heritage Working Group**

This presentation will explore the communicative power of heritage to stress urgency and encourage climate action. The climate emergency has seen a robust response from many sectors including heritage. The intersections between cultural heritage and climate change are complex and multifaceted and were recently explored by the ICOMOS Working Group on Climate Change and Heritage. Their report – Future of Our Pasts: Engaging Cultural Heritage in Climate Action – was released by ICOMOS at the 43rd session of the World Heritage Committee in Baku, Azerbaijan in July 2019. One of the themes which emerged from the report was the unique communicative power of heritage places, and in particular iconic heritage, to stress urgency and encourage meaningful climate action globally.

In June 2018, members of the ICOMOS Working Group partnered with Google Arts and Culture and CyArk, a California based 3D documentation organisation on the Heritage on the Edge Project. This was launched in January 2020 and explored the relationship between cultural heritage and climate change through the lens of five world heritage site: The Historic Mosque City of Bagerhat in Bangladesh, Chan Chan Archaeological Zone in Peru, The Old and New Cities of Edinburgh in Scotland, The Ruins of Kilwa Kisiwani and Ruins of Songo Mnara in Tanzania and Rapa Nui National Park. Using 3D capture technology, videos, interviews with stakeholders, infographics and narrative written by ICOMOS experts, the Heritage of the Edge Project explored issues including loss and damage, the recording and documentation of sites at risk, adaptation planning, carbon mitigation in historic structures,

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and climate justice in an accessible way using an online portal hosted on the Google Arts and Culture portal. The presentation will provide an overview of the project including examples from specific sites. It will also present results from stakeholder feedback and online analytics exploring the efficacy of the project portal as a communicative tool and suggest improvements for future projects based on ongoing collaboration and knowledge exchange with sites impacted by climate change.

Biography

Will Megarry is a landscape archaeologist, geographical information systems (GIS) and heritage management specialist with over 15 years commercial and academic experience. He has a particular interest in the application and transferability of geospatial technologies to archaeology and cultural heritage site management and protection. In recent years, his research has explored the intersections between cultural heritage and climate change with a particular focus on utilising cultural heritage as an asset to raise awareness and encourage climate action. He is also an active field archaeologist with an ongoing project exploring island landscapes in Neolithic Shetland.



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AN ARGUMENT FOR ENVIRONMENTALLY SUSTAINABLE DIGITAL PRESERVATION

Keith Pendergrass, Digital Archivist, [Harvard Business School](#)

Our collective actions are rapidly degrading our natural environment, leading to a set of interconnected crises that have the potential to radically destabilize our global society. To avert the most disastrous consequences, we must shift — in the next few years — to sustainable models in all aspects of society. This talk will argue for a swift, yet thoughtful, transition to sustainable digital preservation that takes into account the full life-cycle environmental impacts of the information and communication technology on which our digital preservation efforts rely. By applying Ehrenfeld's sustainability framework to digital preservation, and coming together as a global community of practice, we can substantially reduce the negative impacts of our work while continuing to secure our digital legacy and provide successful outcomes for our communities.

Biography

Keith Pendergrass is the digital archivist for Baker Library Special Collections at Harvard Business School, where he develops and oversees workflows for born-digital materials. His recent research with Walker Sampson, Tessa Walsh, and Laura Alagna explores ways to integrate environmental sustainability principles into digital archives and preservation standard practice. He holds an MSLIS from Simmons College and a BA in History from Amherst College.



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THE FUTURE OF HISTORY:

Strengthening public histories through digital interventions

Chao Tayiana Maina, [African Digital Heritage](#)

For many communities whose history has been misrepresented, suppressed and erased, digital tools have today presented new ways of engaging with history outside dominant paradigms. Digital spaces and platforms have provided an outlet for minority communities to talk about their frustrations with how their history is told. While at the same time giving many the opportunity to speak about their own pasts through their own lense. What we're seeing today is a proliferation of social media accounts, blogs and vlogs on multiple platforms curating content on African history. What does this mean for the future of history, as audiences teach and learn from each other?

In this talk we explore the role that public digital history is playing in changing perspectives on African pasts. These audience led approaches to history and memory making are drawing in new audiences and creating much needed spaces for dialogue at different levels of society. We ask, what tools do we need to encourage and strengthen this culture of public participation in a sector previously dominated by specialist voices and Eurocentric paradigms? How do we measure the impact of these digital collections and interactions? And how can museums and cultural institutions become spaces that facilitate these discussions?

Biography

Chao Tayina Maina is a Kenyan digital heritage specialist and digital humanities scholar working at the intersection of culture and technology. She is the founder of African Digital

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Heritage a Kenya based non-profit organisation founded to encourage a more critical, holistic and knowledge-based approach to the design and implementation of digital solutions within African cultural heritage. She is also a co-founder of the online initiative, Museum of British Colonialism and a co-founder of the Open Restitution Africa project. Her work has been featured in the New York Times, Reuters, BBC news, BBC Arts, Ntv, KBC and 3Sat.



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EXPANDING THE DIMENSIONS OF DIGITIZATION: The Smithsonian Experience

Diane M. Zorich, Director, Digitization Program Office, [Smithsonian Institution](#)

Founded in 1864, the Smithsonian Institution is the world's largest research, museum, and education complex. It houses over 154 million objects/specimens of cultural, historic, and scientific importance in 19 museums, 9 research institutes, numerous botanical gardens, and a national zoo.

The scale and diversity of the Smithsonian's collections present a unique digitization challenge. From its earliest digitization efforts in the 1970s, the Smithsonian continues to evolve its digitization strategies, methods, and policies to meet the challenge, and to position its digital collections for future needs. An important step in these efforts took place in 2009, with the creation of the Digitization Program Office (DPO).

The DPO's mandate - to work across the Smithsonian to increase the quality, quantity, and impact of Smithsonian digitized collections - is implemented through two programs: mass digitization and 3D digitization. Over the years, as both programs' teams have acquired expertise, they have confronted a number of changing circumstances, and continue to adapt to meet the moment. For the 3D program, this means creating robust infrastructure to automate the resource-intensive aspects of 3D digitization, and provide tools that enhance content creation, management, authoring, and delivery of 3D assets. For the mass digitization program, it means rethinking their workplan (as pandemic-induced closures now restrict physical access to collections), shifting from object imaging to digital records creation and data enrichment.

In February of 2020, the Smithsonian implemented an open access policy that transforms our mission. The Smithsonian Open Access Initiative currently makes three million digital collections assets available as CC0, i.e., available for any use, free of charge, without permission. Open access expands Smithsonian digitization to its fullest dimensions, making it integral to the Institution's efforts to reach broader, more diverse audiences, on their terms.

Biography

Diane Zorich is director of the Smithsonian Institution's Digitization Program Office where she leads an expert team in digitizing Smithsonian collections to maximize their impact for the public. She oversees mass digitization, 3D digitization, and assessment activities that develop and improve digitization processes across the Institution. Before joining the Smithsonian, she was a consultant with over two decades of experience in information management, digitization, and digital policy in cultural organizations.



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AN AFFORDABLE AUTOMATED 3D SURFACE SCANNER:

The case of Canaletto's 'The Grand Canal, Ascension Day'

Xavier Aure, Research Fellow, [Centre for Fine Print Research UWE](#)



From the Woburn Abbey Collection

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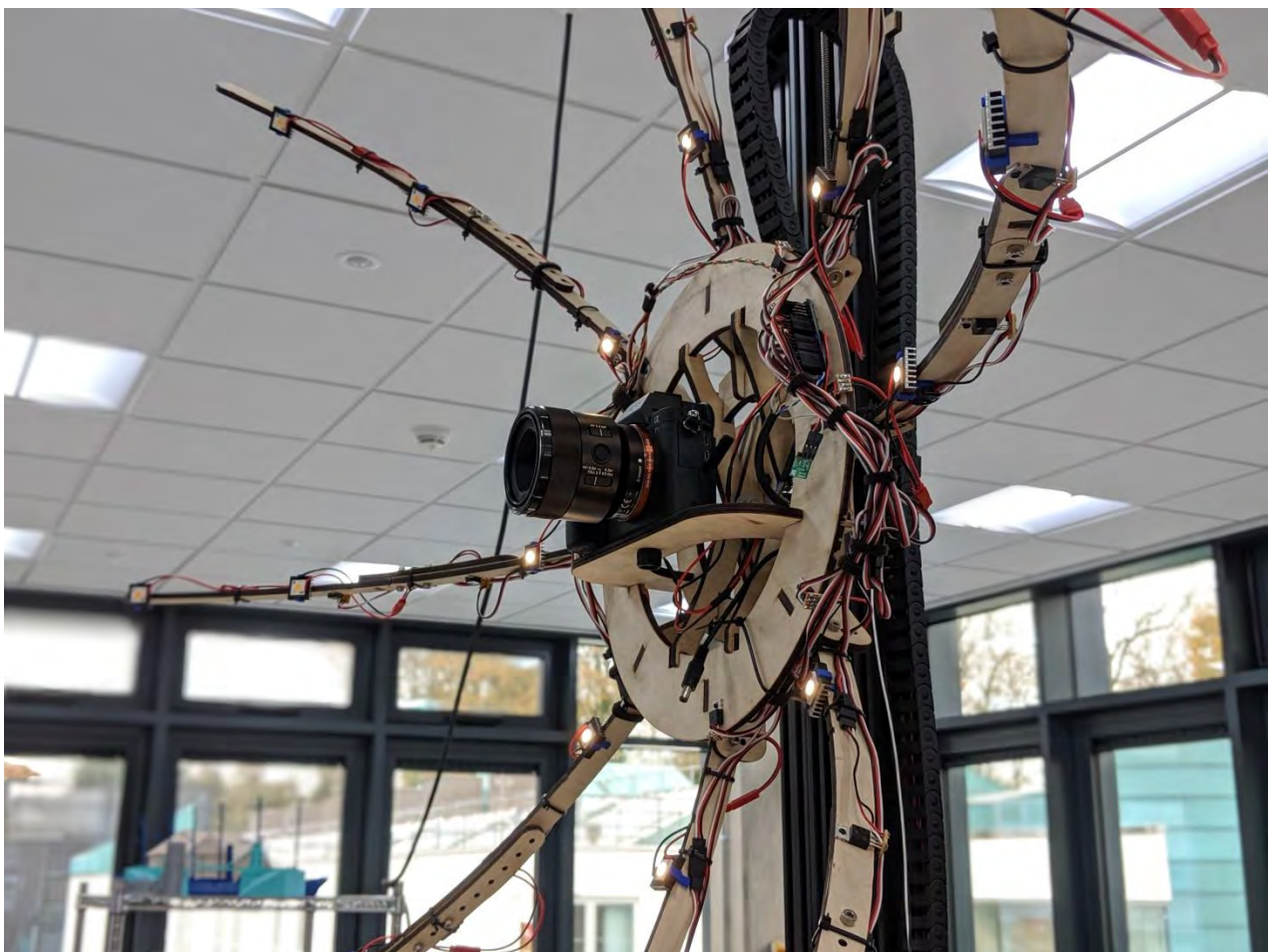
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We have designed an automated system to capture the colour and structure of planar surfaces. The design offers an affordable and simple solution to acquire image data of cultural heritage objects and to produce digital reproductions with high surface detail. The system uses a digital camera coupled to x-y linear guides and combines photogrammetric capture with Reflectance Transformation Imaging (RTI). The system takes advantage of the metric accuracy of photogrammetry and the high-resolution data obtained with Reflectance Transformation Imaging.

The scanner is controlled by intuitive custom software. Given the size of an area to scan, it automatically calculates the number of photographs for each imaging method with a specified overlap. The obtained images are then processed externally and combined with the photogrammetry software of choice.

The goal is to combine the resulting data sets to generate accurate and high-resolution 2D and 3D data for scientific documentation of artworks, for example to record brushwork, damages to the surface or to monitor surface changes over time and for reproduction purposes such as the generation of photorealistic 3D digital models and 3D printed outputs.

We present some initial results from the recording of the painting 'The Grand Canal, Ascension Day' (c.1730-31) by the Italian artist Canaletto from the Woburn Abbey collection comprising a selection of images, 3D renders and video animation.



Biography

Xavier Aure is a Research Fellow at the Centre for Fine Print Research, University of the West of England, in Bristol. His background is in conservation of paintings and decorative historic interiors. His PhD research investigated the use and applications of 2.5D and 3D technologies applied to the study, documentation and presentation of paintings. Currently, he is working on the development of affordable custom scanning systems to record surface texture information and material appearance for cultural heritage applications.



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LIDAR APPLICATIONS FOR PUBLIC ENGAGEMENT, LANDSCAPE RESEARCH AND CONSERVATION IN THE CARNEDDAU, NORTHERN SNOWDONIA

Emily La Trobe-Bateman, Bob Johnston, John G Roberts

ELTB PhD student, BJ Senior Lecturer, JGR Snowdonia National Park Archaeologist

[University of Sheffield](#) and [Snowdonia National Park Authority](#)

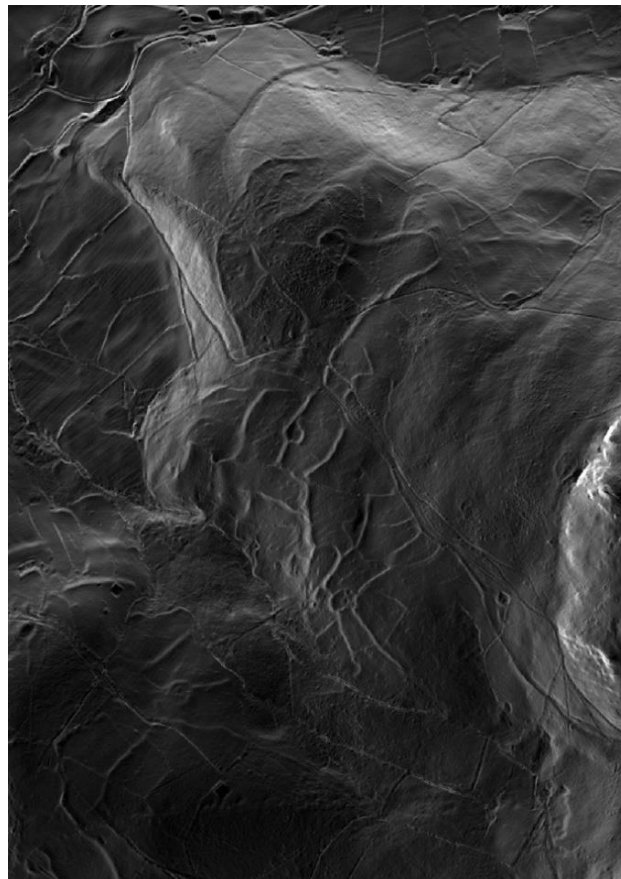


Image 1. Contains Natural Resources Wales information © Natural Resources Wales and Database Right. All rights reserved.

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The Carneddau is an upland massif of around 200 sq km in northern Snowdonia. Agricultural, ecological, environmental and leisure interests are finely balanced and sometimes conflicting. A sizeable population lives around the fringes of the area.

In 2019 a partnership of 23 organisations led by the Snowdonia National Park Authority (SNPA) was awarded a £1.72M National Lottery Heritage Fund (NLHF) landscape partnership grant. The five-year Carneddau Landscape Partnership Scheme will promote a more resilient future for the Carneddau by increasing understanding of its archaeology, cultural traditions and wildlife, improving public participation and instigating conservation work.

A high resolution LiDAR survey, funded by the Welsh Government and the NLHF, has been carried out to support these activities. Its applications will be discussed. Preliminary results will be presented in combination with recent lidar-based doctoral research carried out in collaboration between SNPA and the University of Sheffield. This has highlighted the importance of the exceptionally well-preserved complexes of prehistoric and Roman period settlements and associated fields on the flanks of the Carneddau. Better knowledge of the distribution, origin and condition of ancient fields is will help inform and improve their management and has wider relevance to similar landscapes in other areas.



Image 2. © Emily La Trobe-Bateman

Biography

ELTB: Following work on urban surveys in south west England Emily has been involved in the archaeology of north west Wales for over twenty years, initially as a senior curator and latterly as a PhD student at the University of Sheffield.

BJ: Bob is a Senior Lecturer in Landscape Archaeology at the University of Sheffield. He has a long standing interest and involvement in the later prehistory of north west Wales. He currently researches prehistoric landscape transformations in western Britain.

JGR: John has been the Snowdonia National Park Archaeologist since 2007. He was on secondment to the Carneddau Landscape Partnership scheme as development phase manager between 2017 and 2019.



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BIM TECHNOLOGIES AND URBAN HERITAGE IN THE CITY OF SURAT, INDIA

Busisiwe Chikomborero (Chiko) Ncube Makore, Post-Doctoral Researcher, [University of Salford](#), and Lukman E Mansuri, PhD Research Scholar, [Sardar Vallabhbhai National Institute of Technology Surat](#), India

Heritage cities in India are facing unprecedented pressure, due to the combination of climate change impacts, rapid urbanization and uncontrolled growth. This paper discusses the benefit of applying digital technologies, and in particular Building Information Modelling (BIM), in supporting heritage conservation in the historic city of Surat in India. Despite some efforts from the local government, urban cultural heritage is being neglected and historic buildings keep being replaced by ordinary concrete buildings at a worryingly rapid pace. Documentation and promoting of Surat's heritage is conducted through developing a set of virtual models (3D models and BIM objects) suitable to support the construction sector and traditional architecture and heritage. Discussions of challenges and issues of Surat's urban area is supported by a qualitative dataset, including in-depth semi-structured interviews and focus groups with local policy makers, planners, and heritage experts, triangulated by observation and a photo-survey of two historic areas. Findings from this study reveal a myriad of challenges such as: inadequacy of urban conservation management policies and processes focused on heritage, absence of skills, training, and resources amongst decision makers and persistent conflict and competition between heritage conservation needs and developers' interests.

Biography

Dr Chiko Makore is an inclusive urban design and planning consultant and post-doctoral early career researcher. She has trained in architecture accredited by the Royal Institute of British Architects. She also has a Master's in Urban Planning from Oxford Brookes University and completed her PhD in 2018 from the SURFACE Inclusive Design Research Centre at Salford University. Since the completion of her PhD, she has worked as a post-doctoral researcher in multiple funded international projects on urban heritage conservation including projects funded by the Italian Ministry of Research, the Arts and Humanities Research Council and the Royal Academy of Engineering. Her collaborative research work has resulted in publications in peer-reviewed journals. She has presented her research at international platforms such as at the United Nations Conference on Housing and Sustainable Urban Development (Habitat 3) in Ecuador 2016 where she acted as chair and a panellist in sessions on inclusive urban development. Her current research interests include sustainable development, inclusive and social architecture and design, urban heritage conservation, digital heritage, Global South urbanism, urban planning research, healthy ageing, and inclusive higher education teaching & learning.

Lukman is a PhD Research Scholar in the Department of Civil Engineering of Sardar Vallabhbhai National Institute of Technology (SVNIT) Surat, India. He graduated in Civil Engineering and has a Master's degree in Construction Engineering and Management. His key research interest areas are applications of Artificial Intelligence, BIM, heritage conservation and maintenance management, and inspection and condition assessment of constructed facilities. He has experience with various digitization technologies for heritage monuments, such as laser scanning, photogrammetry, and AR/VR. His work includes digitizing the British, Dutch, and Armenian Cemetery monuments in Surat, India, constructed during 1649-1811 AD.



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NATIONAL BROADCAST ARCHIVE

Einion Gruffudd, Project Manager, [National Library of Wales](#)

This will be a video presentation, which will include an introduction and selected clips from the archive.

The discussion will focus on the fact that this is a national broadcast archive, in a national organisation, which can develop interpretation on a sophisticated and varied scale.

After the introduction to the archive, the activities will be presented, including local ones such as “Sense of Place” and “Remaking Memories”

The focus will then move to the more “National” activities, which will include an Education Clip looking at opportunities to incorporate the source within education syllabuses, a Welsh Clip to support learning Welsh, a Creative Clip which will encourage Archive development for various creative purposes, and metadata development, which will include innovative activities to enable volunteers to contribute online to discover more treasures in this archive.

The presentation will conclude by discussing the linked data, which will focus on the link between the stories in the broadcast archive, and what has been recorded in other sources, including of course, sources at the National Library. The project will aim to develop this collective experience in a practical way for virtual and physical visitors of the National Library.

Biography

Einion started his career with the Caernarfon-based television company, Barcud. He has spent most of his career at the National Library of Wales working with manuscripts, information technology, then managing the Cynefin project which digitized tithe maps, before starting on a project to establish the National Broadcast Archive.

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BIASES IN DIGITAL TECHNOLOGIES:

Gendered identities in museum data

Maria Victoria Guzmán, Professor, Researcher, Observatorio Políticas Culturales

Ever since they were created, museums have played a role in defining, shaping, and smoothing out collective national identities. It is no coincidence that the first museums appeared as nation-states were being formed, and their normative and formative powers have been studied by many, especially the way their collections shape an idea of "the other" in terms of race, class, and gender; and how the museum experienced is shaped by a series of explicit and implicit norms, that again are meant to give an idea of who belongs in the museum – and who doesn't. With that in mind, I will give an analysis regarding the difficulties of including LGBTQIA+ identities in official data systems, that later give shape to collective ideas of who can and cannot be recognized officially as an artist.

Using my experience as researcher who uses SURDOC, a database containing the collections of some of Chile's most important museums, and as part of a team charged with designing a new methodology for museum statistics, I will expose the complexities associated with opening up systems to include more diverse ways of being in the world. Modern understandings of gender that compartmentalize and classify it into two sanctioned categories continue to deprive minorities of recognition, and those who do not identify as male or female, as well as sexual minorities, have been consistently erased from digital data, reduced to the binary of men and women.

The way digital systems and databases are coded thus continue to code patterns of violence and power in relation to LGBTQIA+ identities, and it is key that we become mindful of such embedded biases so as to construct more diverse and inclusive digital technologies.

Biography

María Victoria Guzmán. Researcher specialized in cultural memory, identity and representation. She is a lawyer with postgraduate studies in Philosophy and Aesthetics, and an MA in Cultural and Creative Industries from King's College, London, United Kingdom, in which she was recognized with the award for the best thesis of her generation. Currently she is dedicated to research, cultural criticism and teaching on museums and contemporary art. She is the founder of the blog El Gocerío, dedicated to art criticism in Santiago, and has worked as curator and artistic researcher at the Medial Arts Biennial of Santiago.

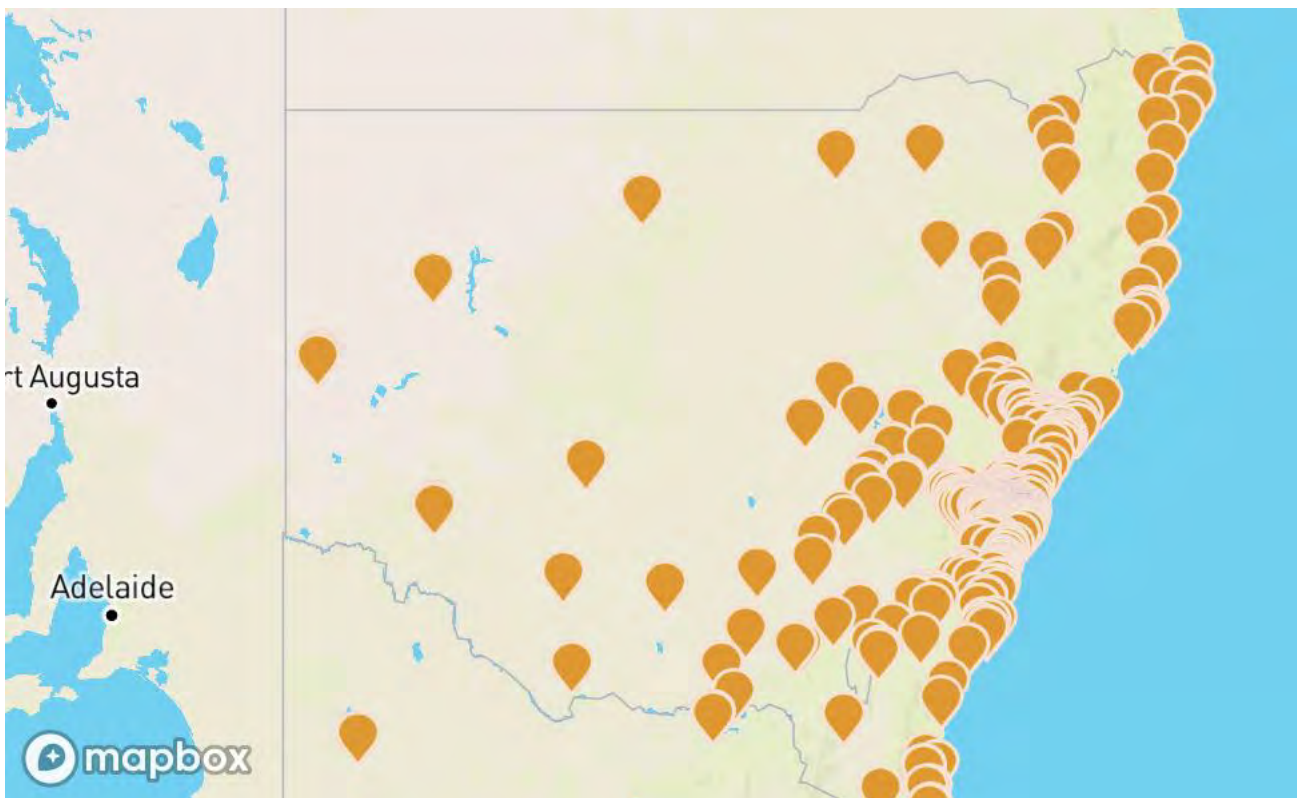


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ARCHAEOLOGY NEAR ME:

Geographically exploring grey-literature report collections

Nicholas Pitt, PhD candidate, [University of New South Wales, Sydney](#)

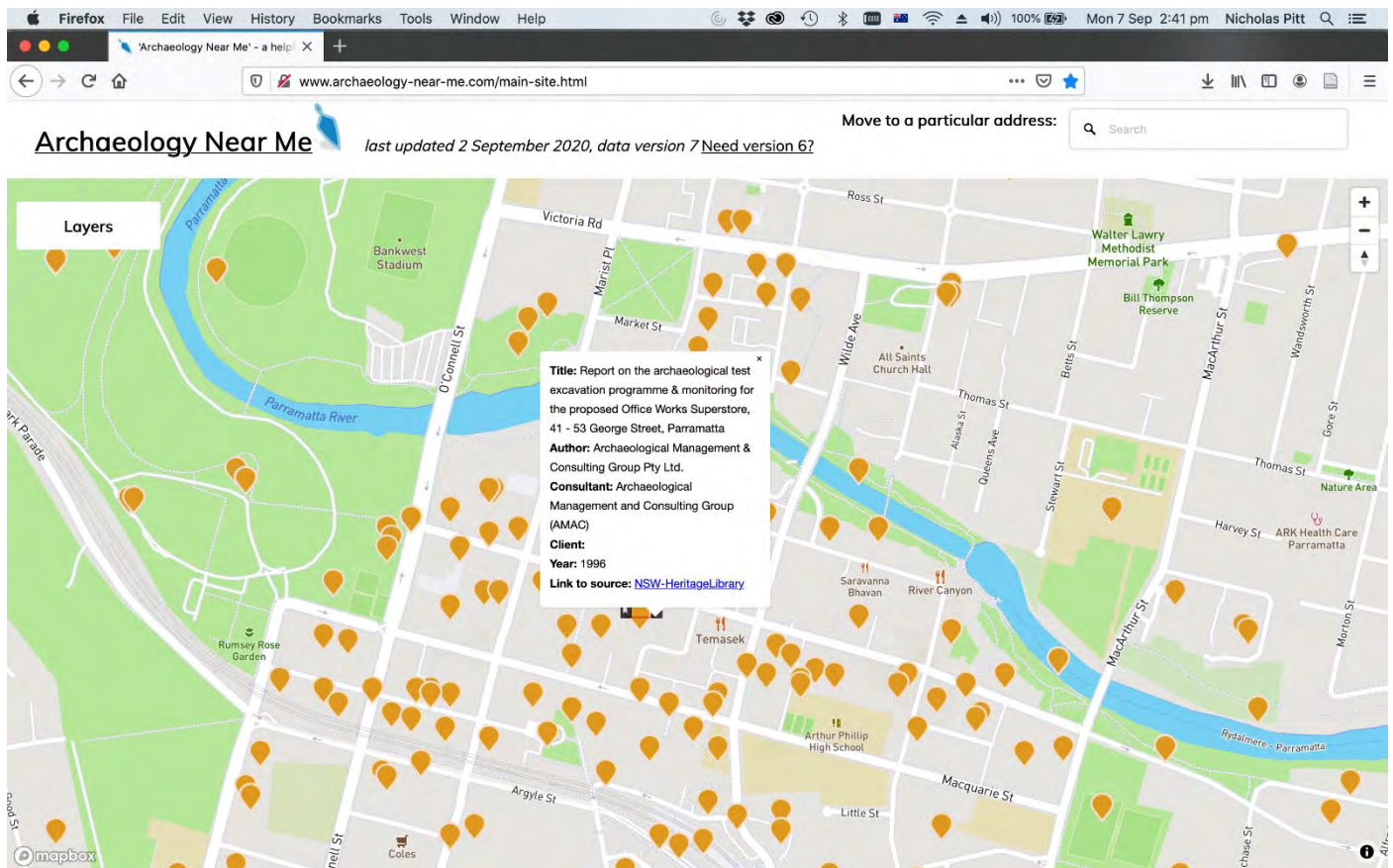


Over the past fifty years, the development of heritage regulations in many jurisdictions has created large quantities of compliance-driven reporting by archaeologists and other heritage professionals. This grey literature typically is hard for even specialists to explore. The geographical location of previous studies can remain unknown, particularly in areas without publicly accessible site registers.

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Archaeology Near Me (ANM) represents a novel way to directly map previous heritage and archaeological reports from New South Wales, Australia. Python scripts are used to extract address and site information from report metadata. Various public sources are then used to geolocate these addresses. The located sites are then presented on a web-based map interface (<http://archaeology-near-me.com/>). On 3 September 2020, it included 5212 heritage reports from the main government regulator, and 3865 'archaeology reports' (broadly defined) from a variety of sources.



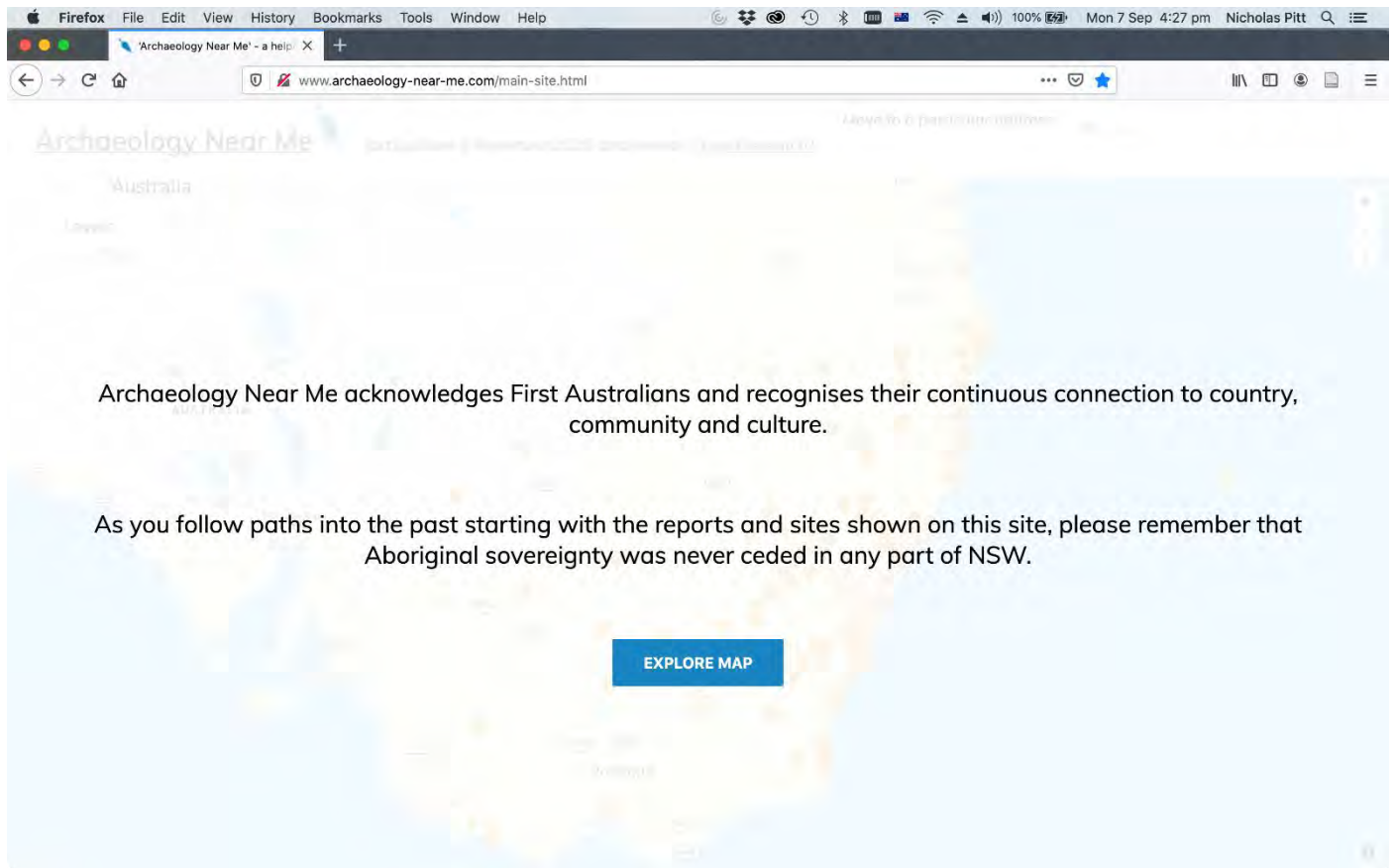
Although I created Archaeology Near Me out of my frustration as a heritage professional, I have increasingly appreciated how it opens up the material for wider use in public history and education. Preliminary conversations with high school teachers point to its value in reaching students of varying ages and abilities.

However, this accessibility also means that the project also faces ethical challenges. In particular significant parts of Australian heritage discourse has long been criticised for how it has reinforced myths associated with Australia's settler-colonial history. Making heritage and archaeology reports more accessible could replicate this discourse further, unless

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deliberate decisions are made in how the information is presented. Strategies such as an Acknowledgement of Country screen and inclusion of non-sensitive, publicly available Aboriginal cultural heritage data are two simple ways that I have attempted to reduce the settler-colonial legacies inherent in the report collections with which I work.



Biography

Nicholas Pitt is an archaeologist and historian with professional experience in non-Indigenous archaeological heritage management in Sydney, Australia. He is currently a PhD candidate in history at the University of New South Wales, Sydney, considering the colonial entanglements of urban settlers in Sydney between the 1820s and 1850s, combining both historical and archaeological sources. He also maintains an interest in GIS and the digital humanities, which he integrates into his wider research practice.

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TEACHING HERITAGE TO ARTIFICIAL INTELLIGENCE THROUGH STORYTELLING

Davar Ardalan, Founder and Storyteller in Chief, [IVOW AI](#)



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We are witnessing history's most promising and disruptive technology -- Artificial Intelligence. It is reshaping human society and changing how we live, learn, and work. Today's AI systems are powerful, but they lack knowledge of the role of women and non-

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western cultures across human history. Therefore we must step up and train AI to be culturally intelligent.

A focus on women is particularly important given the well-documented biases in AI and machine learning datasets, which will perpetuate the same cultural and gender biases into future systems. (You can track examples of bias in AI [here](#).)

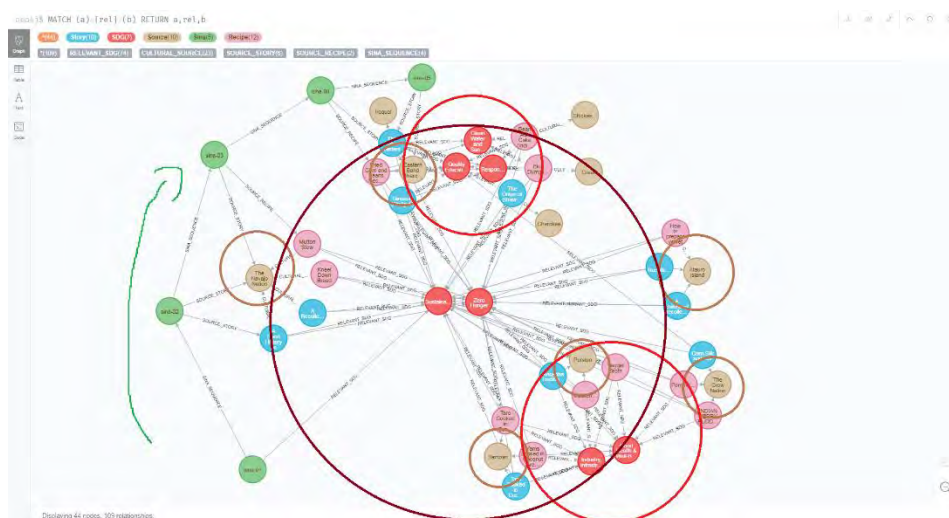
As storytelling technologists, we must take the lead in designing this future, since throughout history the role of women has largely been limited to narratives that diminish their contributions. Bringing cultural awareness to AI through the power of storytelling, at IVOW we are creating an AI tool that interactively shares stories about pioneering women in technology.

Our work has shown that we need to create more free and open source datasets featuring women in all aspects of society; to clean-up current datasets and tag women accurately; and to create machine-ready datasets focused on gender and culture so that AI products and services can be more inclusive.

As children, we learn our history through the stories our family and friends tell us about our community and where we come from. We can take the same approach to teach machines about our heritage, our communities, our myths and legends.

IVOW's digital storyteller Sina is a young conversational AI and at the moment a demo on Google Assistant. Sina has been around for a while, maybe longer than you; she loves learning about human history and then sharing those stories with others. That's what gives Sina purpose. Go ahead, ask her, Who discovered the coronavirus?

https://www.ivow.ai/uploads/1/0/5/3/105390607/shaping_ai_systems_with_cultural_data.pdf



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Biography

Davar Ardalan is the Founder of IVOW, a tech startup bringing cultural intelligence to AI. IVOW stands for Intelligent Voices of Wisdom. The company helps clients incorporate cultural richness, inclusive datasets, and traditional storytelling solutions into their technology. A veteran of NPR, Ardalan is also the Executive Producer of Audio at National Geographic. She's been recognized with a Gracie Award from the American Women in Radio and Television and a shout-out in the popular comic strip Zippy. She is the recipient of a United States Ellis Island Medal of Honor, for individual achievement and for promoting cultural unity.



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THE VIRTUAL PILGRIM

Moshe Caine, Professor Photographic Communications, and Doron Altaratz, Senior Lecturer, [Hadassah Academic College Jerusalem](#)



For centuries, the city of Jerusalem has been a centre for social and spiritual experiences of diverse communities separated from their homes and cultures.

In this project, the crusaders notion of a 'New Jerusalem', the physical reconstruction of the holy city of Jerusalem in Europe, has been reversed and implemented via virtual reality

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technologies applied to two communities who emigrated to Jerusalem from overseas and reconstructed their home and places of worship.

The aim here is to gauge to what extent digital technology can bridge the gap between the physical and the emotional. To express and enhance the dialectical relationship between diverse geographical locations, manifested through lost and reborn communities, the old and the New Jerusalem.



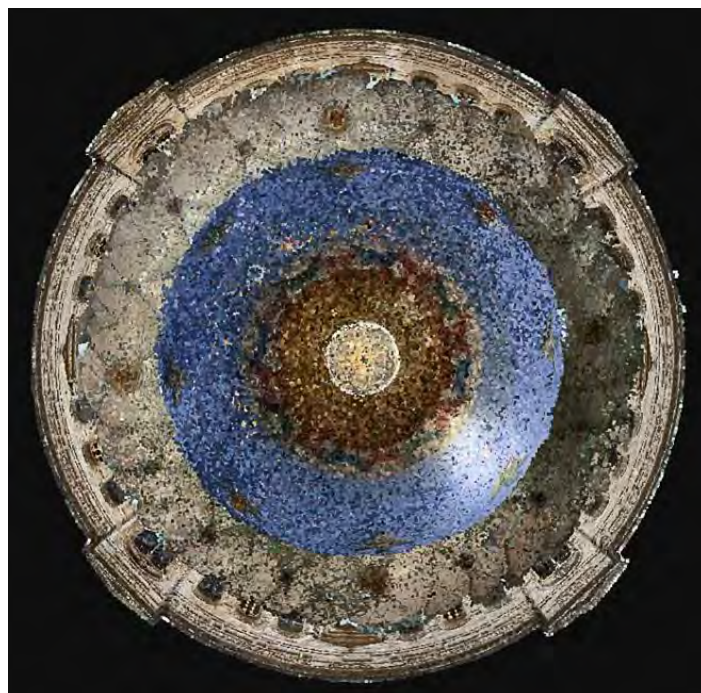
Two test cases are explored: The reconstructed Synagogue of the lost community of Conegliano Veneto, Italy, and the Kidane Mehret Ethiopian Church. Both located today in Jerusalem.

Using laser scanning and photogrammetry, the two structures are recreated as 3D point clouds, enhanced by sounds of prayer and blended with historical imagery. We attempt to create an emotional experience, transcending time and space and intensifying the complex experience of life in a home away from home.

The Virtual Pilgrim attempts to offer a personal encounter, which transcends the objectivity of technology and elevates the subject into a personal spiritual voyage, a virtual pilgrimage.

Two integral components contribute towards this: The virtual reality headset and the point cloud audio-visual experience. These aim to create a voyage, where one may wander at will and experience the atmosphere of a twilight zone, bound neither by space nor time.

The paper outlines the considerations, limitations, and solutions undertaken in the digital recreation of the structures. Likewise, it explores the process of fusing the technical challenge with the desired emotional impact on the user.



Biography

Graduate of the Hebrew University Jerusalem (1977), the Harrow College of Technology & Art London (1980), and Coventry Polytechnic (1989).

Caine's work mirrors the evolution of visual media, including photography, interactive multimedia, VR/AR, multispectral, photogrammetry, 3D scanning, RTI, DAM, UI, UX.

One of the pioneers of the multimedia industry in Israel, establishing and running the Icons company in Jerusalem (1989-2009).

Engaged in academia since 1981.

For the past 25 years Prof. Caine has specialized in digital solutions for cultural heritage preservation institutions, Archaeology, conservation, restoration and presentation. He has a long experience working with museums and educational institutions.



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TRUTH, ETHICS AND EXPRESSIVE TECHNIQUES:

Making digital videos to record and interpret archaeology and cultural heritage.

Sarah Colley, Honorary Fellow, Archaeology, [University of Leicester](#)

As discussed in my paper at Gorffennol Digidol | Digital Past 2020, ideas from documentary film theory can aid understanding of ethical and other qualities of heritage interpretations rendered in audio-digital formats (e.g. virtual reality experiences and digital videos).

Expanding on this theme I will draw on my practical experiences as both a professional archaeologist and a digital video producer to consider ideas about truth, representation, ethics and the role of expressive techniques when making online videos about archaeology and heritage for research, education and public outreach.

Digital photography and videography technologies enable cultural heritage practitioners to capture and interpret detailed visual information about places and objects to support their work. In some cases this visual information is regarded as 'objective data' which can be usefully analysed to solve well-defined research questions or manage practical problems in heritage conservation. Visual information 'captured' by digital technologies is also interpretative and can be further transformed by editing and rendering to present arguments and engage audiences for different purposes. This becomes especially obvious when using digital video technologies which involve decision making about sound and movement as well as 'visuals' which are common to still photography. Most heritage practitioners take still photographs for their work. Producing edited video with sound presents additional possibilities, challenges and responsibilities for archaeologists and heritage practitioners – including those surrounding representation and ethics. I will use case studies from my own work to examine some of these issues – which have broader

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applicability in understanding and appreciating the meanings and values of heritage recorded and rendered through digital technology.

Biography

Sarah Colley has extensive experience as a professional archaeologist and heritage practitioner including on digital projects. She has published on public archaeology, ethics and digital heritage. She also makes digital videos about archaeology and heritage.



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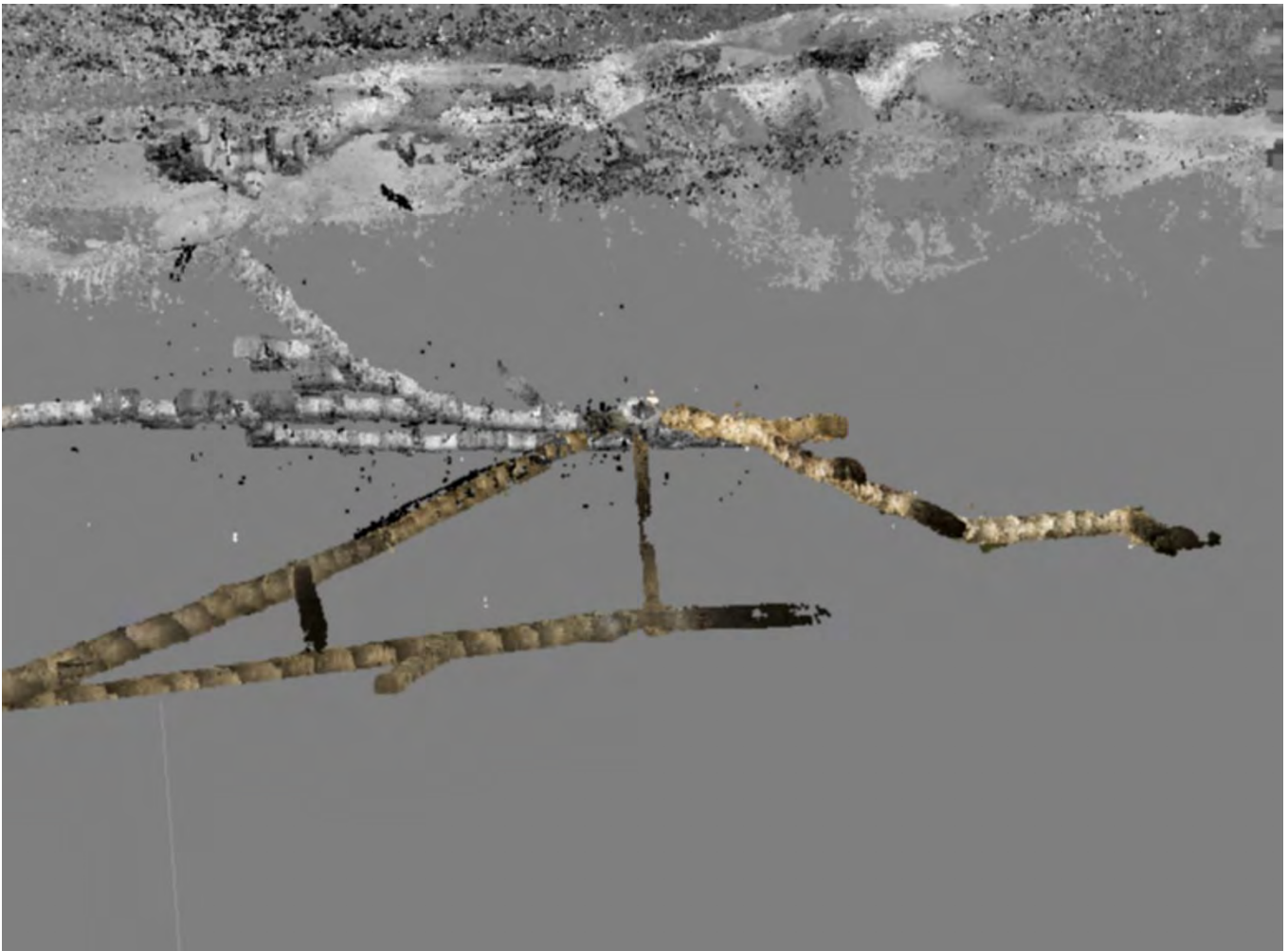
ACCESSING THE PAST THROUGH VIRTUAL REALITY:

First World War landscapes

Todd Ogle, David Hicks, Thomas Tucker

Executive Director, Applied Research in Immersive Environments and Simulations

Professor, Curriculum and Instruction, [Virginia Tech](#)



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This paper describes, through two case-studies, the research and educational outreach emerging from our work in visualizing the past within the fields of archaeology and history using immersive technologies. The Virginia Tech team's work with our international partners integrates laser scanning, photogrammetry, ground-penetrating radar and 360-degree video to produce high-fidelity immersive experiences (virtual or augmented reality) for use within formal and informal learning environments (from schools to museums, and on archaeological and historic sites). These experiences: (1) allow for in-situ data collection and analysis; (2) introduce disciplinary and procedural ways of thinking; and (3) engage learners in archeo-inquiries through the compelling question, "If this Place Could Talk what would it tell us ... ?"

Our case studies illustrate our work at the hill of Vauquois in France and as part of the Dig Hill 80 project in Belgium, both part of the story of World War I. We will share various products of our work which have been used to support teaching and learning in both informal learning spaces including museums and formal learning spaces including classrooms and VR labs in both middle and high school settings.

We are developing an environment which will contribute to both the field work and post-excavation phases of archaeology, connecting to and drawing together potentially relevant ethnohistoric data from archival records, photos, models of artifacts, prior publications and reports for in-virtuo analysis of corroborating evidence and the results of fieldwork that can be rapidly identified and presented to the archaeologist for analysis and interpretation of a site and its artifacts, as well as creating rich experiences for outreach and education. The system will enable more reflexive archaeological practices wherein both field- and lab-based scientists are in close and regular collaboration via the immersive environment. As part of our presentation, our prototype environment will be demonstrated.



Biography

Todd Ogle is the Executive Director of the Applied Research in Immersive Environments and Simulations program and in the University Libraries at Virginia Tech. Additionally, he is an associate director for Immersive Experiences in the Center for Human-Computer Interaction at Virginia Tech and holds affiliate assistant professor appointments in the Department of Computer Science and in the Learning Sciences and Technologies program of the Virginia Tech School of Education. His research investigates the extent to which situational context provided through immersive experiences can help learners visualize and understand the past, the hidden present or future, concepts, or patterns.

David Hicks is Professor of Curriculum and Instruction in the School of Education at Virginia Tech, affiliate faculty of learning sciences and technologies in the School of Education and a member of the Center for Human Computer Interaction at Virginia Tech. He has expertise in instructional design within immersive environments, and a broad background in curriculum and instruction, the learning sciences, and human computer interaction to support designing scaffolds to facilitate learning/training within and across formal and informal spaces.

Thomas Tucker received his BFA from Kansas City Art Institute and his MFA from School of the Art Institute of Chicago where he was a Joan Mitchell MFA grant recipient. He has been evolving complex drawings into animation/kinetic sculptural pieces using 3D software and sound design for over a decade. Maintaining an international profile through his exhibitions and collaborative research often takes him to Japan and the Middle East. This includes: dealing with body mechanics using motion capture, using technology to create a responsive virtual heritage environment, using animation to describe internal organ movements, visualizing new traffic simulations and designing serious games.





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EXTENDED REALITY, INCLUSIVE HISTORY:

Exploring Diverse Campus Histories with Extended Reality Technology

Paul Quigley, Jessica Taylor, Alex O'Dea, Kenny Barnes, Emily Humes - Associate Professor, Assistant Professor, Undergraduate Students – [Virginia Tech](#)



In preparation for the 150th anniversary of the university in 2022, the Visualizing Virginia Tech History team is experimenting with creative technologies to research and present history in new ways. Our student-faculty team brings together research questions and methods from Computer Science, History, the Libraries, Visual Arts, and Education.

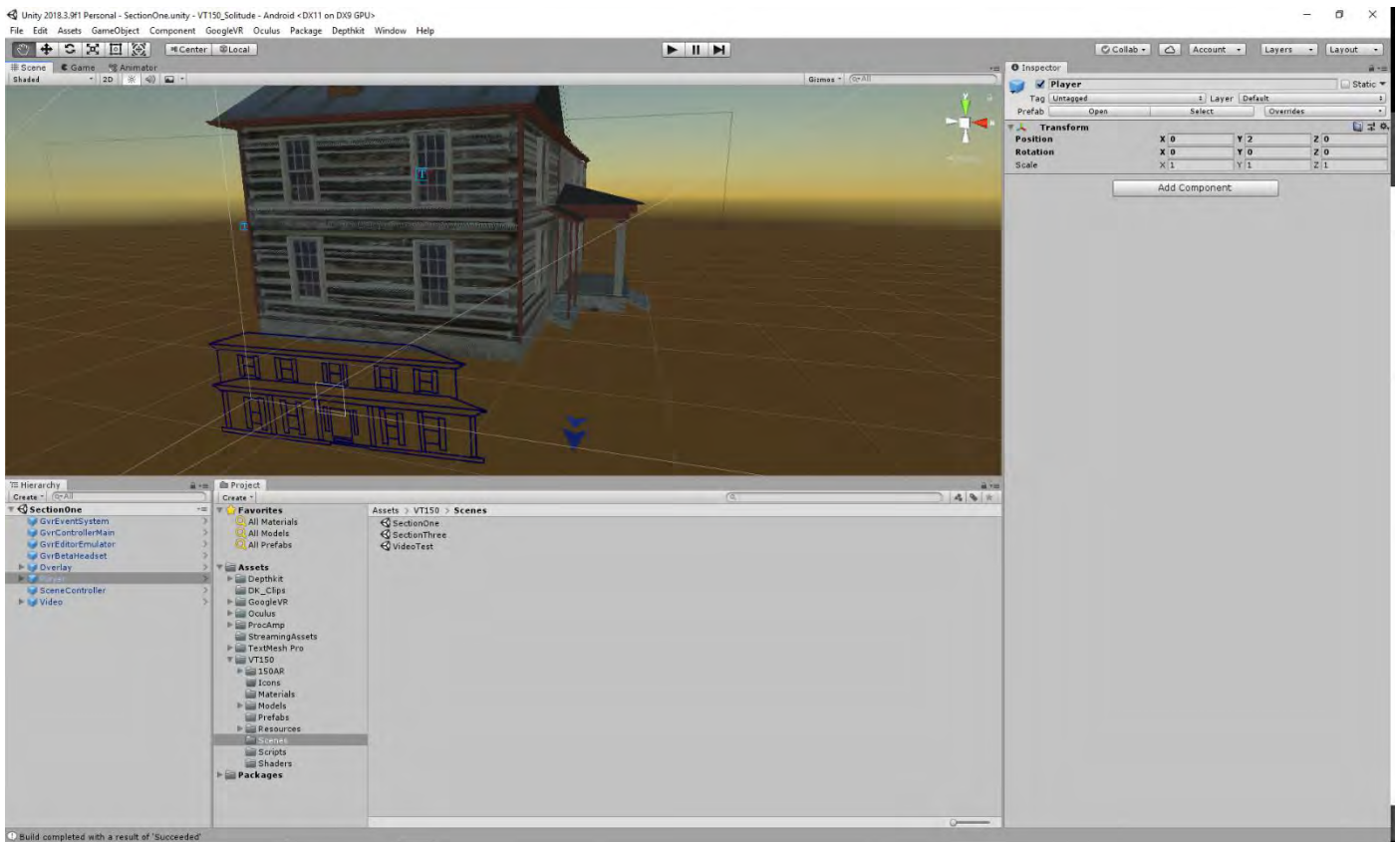
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This presentation will explore the benefits and limitations of using technology to bring hidden histories to life, focusing on Solitude, the antebellum slave plantation of the wealthy Preston family and the oldest building on Virginia Tech's campus. Using wearable Extended Reality (AR+VR) technology, we employ green-screen interviews with descendants of enslaved people, virtual tour guides, 19th-century documents, historical photos, and 3D building recreations. These techniques allow visitors to “see” representations of the past that have been destroyed or repressed; they allow us to tell history in more engaging and more complete ways. Yet we will also share our struggles with this technology's limitations in exploring certain kinds of poorly-documented stories that lack compelling audio-visual material.



This presentation will also discuss more generally the specific storytelling affordances of Extended Reality. Rather than the linear narrative experience that history books tend to promote, ER allows for the presentation of multiple stories, from different time periods, featuring different historical actors and themes—all in the same place. It also makes possible a more interactive format, allowing visitors to choose which aspects of the topic to explore, and allowing them to extend their experience by digging deeper into optional historical documents, photographs, and expanded video footage. Here, too, we will address the limitations as well as the opportunities of Extended Reality storytelling, discussing the challenges of fitting important themes into a short timeframe, as well as other technological constraints. In short, Extended Reality closes off certain storytelling possibilities even as it opens others.



Biography

Paul Quigley is Director of the Virginia Center for Civil War Studies and the James I. Robertson, Jr. Associate Professor of Civil War History in the History Department at Virginia Tech.

Jessica Taylor is Director of Public History and assistant professor of history at Virginia Tech.

Alex O'Dea is an undergraduate history major at Virginia Tech.

Kenny Barnes is an undergraduate student and teaching assistant studying history and sociology at Virginia Tech.

Emily Humes is an undergraduate history major at Virginia Tech



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WAVE IMMERSIVE EXPERIENCES IN MUSEUMS

Amy Shakespeare, Innovation Manager, [Cornwall Museums Partnership](#)



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This paper will discuss the three key strands targeted by the wAVE project; Digital Revival, User-Centred Design, and Impact and Legacy. Overall, these strands will be contextualised through an explanation of the project's aims and the main challenges it faces.

Digital Revival – changing perceptions by exploring how innovative technologies can enhance and change the way visitors experience and interact with heritage. We will illustrate this strand by firstly, discussing our partnership with Falmouth University Games Academy, which is developing the technology and software for each of the immersive experiences. Secondly, we will share our learnings of developing organic partnerships with tech companies such as Hi9, to show how such partnerships can help innovative development with museums and heritage associations.

User-Centred Design – putting staff, volunteers, and communities at the centre of the design process to ensure that the experiences meet the needs of their future users. Here we will discuss the user-centred design process, highlighting focus groups with various education establishments alongside more general public user testing. This discussion will lead to a showcase of the main impacts that this process has had on the experiences created by wAVE.

Impact and Legacy – raising the profile of Cornwall's unique culture and heritage offer. Future-proofing businesses by providing free digital skills and immersive technology training, to allow wider tourism businesses to harness the opportunity presented by immersive technology. This section will focus on the Immersive Tech Introductions sessions that are running throughout the course of the project, particularly, why access to this type of training is so important in rural communities such as Cornwall and the Isles of Scilly. These training efforts have helped to foster a sense of ownership over technological change for SMEs by providing people with the skills and knowledge to begin embracing innovative technologies to benefit their business.

Biography

Amy is Cornwall Museums Partnership's Innovation Manager. She has previously worked at the National Maritime Museum, Cornwall and at the National Trust in visitor experience at Godolphin, the Tin Coast, and the West Cornwall portfolio. Currently studying for a PhD with the University of Exeter, Amy is also a Young Trustees Movement Champion, and was a Clore Emerging Leader funded by Historic England in 2019. She was awarded the Professor Susan Pearce Prize for her MA dissertation, 'What If We Want To Give It Back? The Potential of Democratising the Repatriation Process in Britain'.



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