



Contents

Schedule	3
Abstracts	4
Session 1	4
Digital Recording and Analysis of Historical Trees in Britain	4
The Old Dubheads Smithy: Using photogrammetric capture for the creation of hybrid digital-physical educational tools to aid Scottish vernacular knowledge and skill transfer.	4
By Daylight, By Lamplight: Digital Methods in the Exploration of Historical Lighting.....	5
Session 2	6
The Tale of Three Cities: Strategies for Improving Accessibility and Reusability of Heritage Data	6
Kent Archaeological Society: taking a society online.....	6
Identifying Landscape Reuse and Persistence from Metal-detected Artefact Scatters	7
How do you explain geoarchaeology to non-archaeologists? – Data interoperability and reuse through domain ontologies	7
Session 3	8
Communicating heritage through immersive spaces: early lessons from video and projection-based visualisation	8
Features of Digital Transformation and Accessibility in 22 Ukranian Museums	9
Waterscape Text Analytics	10
Session 4	10
Computer Vision in Maritime Archaeology: Machine Learning for Shipwreck Detection and Analysis.....	10
Changing Seascapes: the Impact of Coastal Change on Lebanese Maritime Archaeology 11	
Digital Approaches to the monitoring & recording of a Thirteenth Century shipwreck outside of Poole Harbour, Dorset.....	11
Posters	12
Inclusive Design Strategies: Creating an Accessible Digital Heritage Experience of the Govan Sarcophagus for Older Adults	12
Ballad Hawking: Sharing Soundscapes of the Early Modern World	12

Schedule

Friday	1230-1300	Registration	
	1300-1315	Welcome and housekeeping	
	1315-1445	Session 1	Andrew Hill
			Catherine Bellamy
			Kevin Deng
	1445-1500	Coffee	
	1500-1700	Session 2	Alphaeus G W Lien-Talks
			Jacob Scott
			Eljas Oksanen
			Anna Bekesi
	1700	AGM	
	1800	Walk to Daphne Oram	
		Wine reception	
Saturday	0930-1100	Session 3	Angus Pattinson
			Dushyant Naresh
			Tetyana Samsoniuk, Anton Shynkaruk and Dmytro Maslov
			Caitlin Jacobson
	1100-1130	Coffee	
	1130-1330	Session 4 Marine/ Maritime	Cal T. Pols
			Carley Divish
			Celia Prescott
			Tom Cousins
		Close	

Abstracts

Session 1

Digital Recording and Analysis of Historical Trees in Britain

**Andrew Hill, University of York*

This paper develops and evaluates digital methods for visually recording and analysing historical British trees. It first establishes the importance and abundance of living trees of historical significance in Britain, an underutilised source of archaeological evidence, and assesses current visualisation methods, identifying often limited quality and utility particularly for lateral but also for spatial approaches. This methodological underdevelopment reflects often weak protections for historical trees, with notable losses like the Sycamore Gap tree, for which reform is sought. Achieving such reform may require more sophisticated heritage recording and analysis methods. Trees which are significant for their cultural modifications, location and notability are distinguished, and lateral methods for cultural modifications are prioritised for development.

Accordingly, the paper assesses potential digital methods, and determines that photography and structure from motion photogrammetry are the most appropriate. A versatile workflow is therefore developed that applies context photography, scale photography and photogrammetry, with the latter processed and published as orthophotos and line drawings. Ancillary methods, like taped survey, can also be incorporated. These methods are piloted on three case studies in York. First, a grafted pear-barked beech in Museum Gardens is recorded, has its additional modifications identified, and its propagation date estimated. Second, the topiary garden at Heslington Hall is recorded and has some continuities with its nineteenth-century form identified, and its history assessed and qualified given this archaeological evidence. Third, historical London planes in central York are assessed thematically, establishing some relationships with higher-status locations, historical pollution, and preferences for unmodified trees. In these pilots, each technique exhibited different strengths and weaknesses. Generally, photographic methods are more practical, including for time, cost and training, and are easily understood. However, photogrammetric methods can provide fuller records and have broader analytical potential. Overall, the methods proved successful and are recommended for further application.

The Old Dubheads Smithy: Using photogrammetric capture for the creation of hybrid digital-physical educational tools to aid Scottish vernacular knowledge and skill transfer.

**Catherine Bellamy, Historic Environment Scotland and Glasgow School of Art*

Scotland's vernacular buildings use site-specific and localised materials in their construction and a decline in the transmission of traditional craft knowledge has put these sites at risk. This research explores new pedagogical approaches and the creation of hybrid educational tools to inform a new generation of vernacular custodians and craftspeople in Scotland.

Photogrammetric capture of The Old Dubheads Smithy has led to the development of hybrid tool kits through the creation of 3D printed (3DP) objects and their interactive digital counterparts. The data capture methodologies and workflows developed as a part of this

research are outlined, so they may be replicated or built upon, the work is a foundation of creating educational resources to aid vernacular conservation knowledge and principles. Final outcomes include the creation of fourteen physical objects, created from photogrammetric capture data and 3D modelling – each object has a digital resource that includes textured representations of the 3DP objects or interactive media. Digital content includes informative annotations, guidelines, animations and explores the narrative of The Old Dubheads Smithy and the conservation and repair work needed. This work begins to investigate the relevance of blended and engaging learning methodologies to encourage and increase the skilled labour force in Scotland, to ensure vernacular sites receive meaningful and appropriate conservation and care.

By Daylight, By Lamplight: Digital Methods in the Exploration of Historical Lighting

**Kevin Deng, University of York*

This project explores the synthesis of terrestrial laser scanning, structure from motion photogrammetry, and 3D modeling. This combination is in pursuit of an accurate, efficient model which may serve as a test bed for experimentation in virtual space. Laser-corrected photogrammetry has been explored before, but largely within the aerial capture of landscapes. A corrected model would hold the same visual appeal as a photogrammetric product, using the laser scans to maintain metric accuracy while shedding the intense processing demands of an algorithmically generated model. Crucially, this efficiency would allow for an archaeological model to be redistributed and reinterpreted by secondary users. The methodology begins with the photography and laser scanning of the subject. The laser scan data is processed and aligned with the photographs to create a calibrated model. This calibrated model is then neatenened and staged within 3D modeling software, moving from documentation to interpretation.

This methodology is, however, currently limited by both practical and technical concerns. As applied to St. John the Baptist of Kirk Hammerton, this project has created a striking yet ultimately inflexible 3D model. This project depicts St. John the Baptist under a variety of light sources and times of day. While it is possible to make evocative scenes using such methods, it proves much more difficult to fully eliminate qualities inherent to the process of photogrammetry, or to digitally simulate the full spectrum of light's potential behaviors. Nonetheless, laser-corrected photogrammetry still holds great potential as a reasonable compromise between metric fidelity and artistic utility. With more informed workflows and more capable software programs, such comprehensive capture may be more feasible for archaeologists of the near future, and serves as a personally meaningful exercise in engaging with an archaeological space.

Session 2

The Tale of Three Cities: Strategies for Improving Accessibility and Reusability of Heritage Data

Alphaeus G W Lien-Talks, University of York, Historic England, Archaeology Data Service

Heritage data's heterogeneity, driven by diverse research backgrounds and project contexts, creates challenges in ensuring data is findable, accessible, interoperable, and reusable (FAIR) (Wilkinson et al., 2016). This paper examines strategies to enhance the accessibility and reusability of heritage data, drawing on lessons from the High Street Heritage Action Zone (HAZ) projects in towns like Northallerton, Kirkham, and Chester, with a focus on Planning Policy, wellbeing, and hidden heritage.

Through qualitative analysis of stakeholder interviews and quantitative analysis of questionnaires, the research identifies key practices for managing heritage data. Findings highlight the importance of transparent data management planning, especially in large-scale projects like HAZ. Prioritising open formats, raw data over synthesised outputs, and deposition in trusted repositories are essential strategies. Additionally, the use of computational techniques such as APIs and text mining can effectively link disparate resources. Implementing FAIR principles through these methods can mitigate challenges like copyright restrictions, inaccurate metadata, and reliance on proprietary software, while fostering collaboration and outreach.

However, barriers such as limited funding, resistance to open data, and the use of non-open file formats persist, underscoring the need for continued engagement across sectors. Furthermore, issues like copyright and tacit knowledge further limit accessibility.

This paper advocates for applying FAIR data principles in heritage datasets, arguing that these principles, when appropriately applied, significantly enhance knowledge discovery. Nonetheless, ongoing efforts are required to develop solutions that address barriers and leverage new opportunities from emerging computational techniques. Promoting the accessibility and reusability of heritage data remains an ongoing process, with collaborative and transparent strategies offering substantial benefits for researchers, practitioners, and the public.

Kent Archaeological Society: taking a society online

Jacob Scott, Canterbury Christ Church University, Kent Archaeological Society

The Kent Archaeological Society (KAS) has published printed archaeological and historical studies– including the flagship *Archaeologia Cantiana*– since its founding in 1857. KAS expanded its role in disseminating archaeological information to the interested public through online platforms since the turn of the millennium, and today hundreds of publications and thousands of articles and research resources are accessed by several hundreds of online researchers and visitors daily, albeit with many legacy elements from unedited scanned document images and PDF files through to ‘HTML-first’ publications and transcriptions. In more recent years, these collections have been joined by audio, video, and Geographic Information Systems (GIS) across a variety of online platforms. As the KAS works toward the full digitization and integration of its online collections and back catalogue, employing modern web

accessibility standards, GIS, Virtual Reality, and Semantic Web principles, consideration is being given to whether there is a role for the society today in bridging the digital skills gap which seems to have often resulted in many accessibility and web technologies being underused for history and archaeology projects and archives at the local and regional level. This paper will investigate the process, accessibility and value of an antiquarian society's online interface in a rapidly changing digital landscape.

Identifying Landscape Reuse and Persistence from Metal-detected Artefact Scatters

Eljas Oksanen, University of Reading

This paper explores replicable computational methods for identifying long-term persistence, or reuse of specific landscapes, from metal-detected artefact scatters. Since 1997 over 1.1 million public finds – the vast majority reported by detectorists – have been recorded in the Portable Antiquities Scheme in England and Wales online database [finds.org.uk]. Similar schemes have been set up in several other European countries over the last decade. These have produced a very significant amount of new archaeological information reported by citizen scientists, often from places where few or no other archaeological investigations have been conducted.

This presentation builds on the idea of using English metal-detected finds to investigate multiperiod landscape palimpsests, as developed by Adam Daubney (2015). It considers a workflow consisting of complementary and easily replicable methods in the R programming language for identifying, analysing and visualizing patterns in artefact scatters that could be related to “persistent places”. This research stems from currently ongoing work with the AHRC-funded *The Medieval Ritual Landscape* project at the University of Reading and the British Museum for identifying deliberate ritual depositions and reuse of ancient landscapes during the Middle Ages. It aims to produce a transferable methodological framework useful for examining a wide variety of diachronic depositional activity.

While spatial statistics/GIS analysis and other “big data” approaches have been increasingly applied to public finds material in recent years, these approaches are rarely easily replicable outside their original research contexts. Especially given that large quantities of finds data that is now being recorded internationally, this research responds to the demand for transparent and fully reproducible workflows that can be applied independently to new finds datasets using only the code and documentation provided.

How do you explain geoarchaeology to non-archaeologists? – Data interoperability and reuse through domain ontologies

Anna Bekesi, University of Glasgow & Museum of London Archaeology (MOLA)

Urban soils play a fundamental role in the lives of cities. It is essential for the future to preserve it in a state where it can fulfil its ecological and economic functions and meet the needs of all its stakeholders. Development-led archaeology generates significant quantities of soil data. The geoarchaeological data collected as part of assessments and excavations provide up-to-date physical, biological, and chemical soil measurements, as well as provides the basis for our understanding of long-term human-soil interactions. This data also has the potential to serve as a unique public resource for soil management, policy-making, and soil health.

The collaborative research project, “Past in Present Soils”, uses development-led archaeology data to enable interdisciplinary collaboration between archaeologists, soil scientists, development companies, urban farming communities and local authorities within Greater London. By cross mapping the archaeological and soil science domains using semantic modelling methods, it allows for a more holistic understanding of soil. The proposed data model illustrates creating and disseminating data in a way that holds benefits within the discipline and beyond.

Using the above project, this conference paper aims to facilitate critical discussion regarding currently used geoarchaeological vocabularies, ways of disseminating archaeological knowledge and ontologies as an avenue to support data sharing. It also examines the relationship between open, linked data and development-led archaeology.

Session 3

Communicating heritage through immersive spaces: early lessons from video and projection-based visualisation

Dushyant Naresh, University of Bradford

High fidelity data capture, processing, and visualisation for archaeology and heritage science has become more commonplace in recent years. Nowadays, archaeologists are well-equipped to successfully handle complicated, precision instruments and record rich datasets. Methods of data capture and visualisation in archaeology have also seen significant advances. However, translation of archaeological visualisations for lay audiences still poses some challenges.

With the emergence of experimental modes of storytelling, heritage practitioners are uniquely positioned to utilise new high-fidelity data to engage with individuals and communities. Visualising Heritage is a Research Centre within University of Bradford’s School of Archaeological & Forensic Sciences. Since 2010, the team has been researching, developing, and producing cutting-edge archaeology and heritage-led visualisations using varied instrumentation, from consumer grade handheld devices to state-of-the-art, vehicle-mounted laser scanners. With the tools in our hands to capture and visualise data, the important question arises - how do archaeologists and heritage professionals tell stories with these technologies?

This presentation explores our initial learnings from two potential storytelling devices - Projection and Augmented Relief Mapping (PARM) and immersive projection mapping spaces - and their applications in communicating heritage and engaging with a broad range of audiences.

This paper will look at the underlying technologies behind these mediums and what distinguishes them from other forms of immersive storytelling. Then, we will examine the methodologies used to capture, edit, and produce content for these systems, how they may differ from more traditional data capture methods, and the advantages and limitations of these approaches. Finally, we’ll explore our evaluation techniques, initial findings, and our experiences with community collaboration.

Features of Digital Transformation and Accessibility in 22 Ukrainian Museums

Tetyana Samsoniuk, PhD of Historical Sciences and Deputy Director for Development and Implementation of Digital Technologies at the Rivne Regional Museum of Local Lore.

Anton Shynkaruk, PhD in Political Sciences and Associate Professor, National University of Water and Environmental Engineering.

Dmytro Maslov, Deputy Director for Administrative and Economic Work, Rivne Regional Museum of Local Lore and co-founder of the Rivne Regional Museum Fund.

The digital transformation of museums involves adopting new technologies and reshaping organizational practices to enhance visitor experiences and operational efficiency. Museums are integrating digital tools to improve physical environments and expand virtual capabilities, including interactive elements, social media, and mobile applications.

These advancements enable museums to engage audiences more interactively, extending their reach and increasing the public value of their collections. Digital transformation also supports better preservation and promotion of cultural heritage, optimization of internal processes, and sustainable development through innovative business models and community involvement.

The study of 22 museums participating in the MemorySavers project revealed significant differences in approaches to digital transformation, reflected in their websites and digital tools. Variations in domains and content management systems (CMS) highlight different strategies museums use to support and update their resources. Museums with .org, .org.ua, and .com.ua domains show a wide range of resource usage, from commercial to non-commercial institutions. CMS usage varies from popular platforms like WordPress to proprietary solutions, allowing museums to adapt sites to their needs, though issues with updating and maintenance are also noted.

Surveys indicate that museums are actively integrating digital elements such as online exhibitions, QR codes, immersive projects, and video content, expanding access to their resources and engaging new audiences. However, not all museums use advanced technologies like AR/VR or mobile apps due to high costs and technical challenges. This suggests that while digital transformation is gaining popularity, its implementation is uneven and dependent on each museum's resources and strategic priorities.

Analysis of digital accessibility of Ukrainian museum websites revealed numerous deficiencies that require urgent improvement. Over half of the visited museums have accessibility issues, highlighting the need for enhancements in areas such as clickable elements, document structure, graphic elements, menus, and orientation support. For example, the Rivne Museum of Local Lore and Chernihiv Regional Historical Museum have serious issues that require radical changes to meet accessibility standards.

Some museums show partial compliance with accessibility standards, particularly due to well-organized headings and forms. However, even these sites need improvements, especially in graphic elements, text readability, and mobile orientation support. For instance, the Museum of Folk Architecture and Life in Lviv and the Transcarpathian Museum of Folk Architecture and Life exhibit mixed levels of accessibility, requiring additional efforts to achieve full compliance with standards.

Waterscape Text Analytics

Caitlin Jacobson, University of Aberdeen

Usually mixing electronics and water is not a good idea. However, utilizing computational tools to collate the epistemological and ontological cultural practices of waterscapes is proving to be good idea. Wolfram Mathematicas' program is providing a window into seeing culture and society through water. This point of view will be illustrated through the Nunalleq Project as a case study. The Nunalleq waterscape will be identified, semiotically decoded, and applied to the modern water challenges faced by the Quinhagak village in this presentation.

Session 4

Computer Vision in Maritime Archaeology: Machine Learning for Shipwreck Detection and Analysis

Cal T. Pols, University of Southampton

Shipwrecks constitute a significant amount of underwater cultural heritage (UCH) sites that are likely to be increasingly discovered due to developments in autonomous marine survey methods and continued offshore development. Moreover, the increasing availability, spatial coverage, and resolution of (marine) remote sensing data is creating pressure on current archaeological workflows to identify potential sites in these large datasets. As a result, new archaeological prospection methods are embracing machine learning techniques to identify archaeological sites and features in remote sensing imagery.

This research compares different machine learning workflows against a topographic inference method (Inverse Depression Analysis) to evaluate their performance for identifying shipwrecks across large areas of the United Kingdom's (UK) continental shelf in bathymetry data. Additionally, through this comparison, this research also aims to discuss the viability of off-the-shelf semi-automated methods for archaeological site detection in large spatial datasets.

Lithics out of Context: data-based analysis for post-context marine lithics

**Carley Divish*

Shipwrecks constitute a significant amount of underwater cultural heritage (UCH) sites that are likely to be increasingly discovered due to developments in autonomous marine survey methods and continued offshore development. Moreover, the increasing availability, spatial coverage, and resolution of (marine) remote sensing data is creating pressure on current archaeological workflows to identify potential sites in these large datasets. As a result, new archaeological prospection methods are embracing machine learning techniques to identify archaeological sites and features in remote sensing imagery.

This research compares different machine learning workflows against a topographic inference method (Inverse Depression Analysis) to evaluate their performance for identifying shipwrecks across large areas of the United Kingdom's (UK) continental shelf in bathymetry data.

Additionally, through this comparison, this research also aims to discuss the viability of off-the-shelf semi-automated methods for archaeological site detection in large spatial datasets.

Changing Seascapes: the Impact of Coastal Change on Lebanese Maritime Archaeology

Celia Prescott, University of Southampton

Coastal change presents a clear threat to cultural heritage. Maritime archaeological sites at the boundaries between land and sea are at risk of flooding and erosion exacerbated by sea-level change. As it has been widely acknowledged that not all heritage can be saved from destruction, it is important to study the resilience of endangered maritime archaeology, or their ability to withstand and adjust to the adverse effects of coastal change. The Levant is an area both rich in maritime archaeology and subject to the adverse impacts of coastal change. In Lebanon, assessments of coastal resilience in light of these adverse impacts are important in order to inform effective management strategies for its valued coastal heritage and places.

The overarching aim of this research is to assess the impacts of coastal change on the maritime archaeology of the Lebanese coast, through a geophysical and hydrodynamic characterisation of its nearshore environment and sediment dynamics. To achieve this goal, three objectives are proposed. First, to classify Lebanese maritime archaeology in a way that incorporates both archaeological and geomorphological criteria. This classification will lay the foundations for a detailed geomorphological study of Lebanese maritime archaeology. Second, to explore Lebanese nearshore sediment and hydrodynamics via the review and interpretation of geophysical and hydrodynamic data – both published and unpublished – as well as through planned field campaigns. Detailed, site-level interpretations of sediment and hydrodynamics will facilitate more accurate predictions of the impacts of coastal erosion and sea-level change on the maritime archaeology of the coast. Finally, the results of this nearshore characterisation will be applied to assessments of coastal resilience at two case study Lebanese maritime archaeological sites. Thus, this research aims to contribute towards the means and put forward a model for the assessment of the resilience of maritime archaeology to coastal change in Lebanon.

Digital Approaches to the monitoring & recording of a Thirteenth Century shipwreck outside of Poole Harbour, Dorset.

Tom Cousins, Bournemouth University

In 2019 Maritime Archaeologists from Bournemouth University identified the remains of a thirteenth century shipwreck carrying a cargo of Purbeck stone, including several mortars. As shipwrecks are a dynamic resource and time on the site is often limited the BU team has used a variety of differing digital techniques to record and monitor the site. These range from wide area geophysical surveys repeated every six months to photogrammetry surveys and the recording of finds on land using structured light scanners. These various techniques can then be combined in in GIS and other computer programs for a variety of applications. This paper will present the various methodologies and lessons learned from the surveys.

Posters

Inclusive Design Strategies: Creating an Accessible Digital Heritage Experience of the Govan Sarcophagus for Older Adults

Angus Pattison, Glasgow School of Art

As we progress further into the digital age, it is critical to develop virtual heritage experiences that are equitable and accessible to technologically disadvantaged end-users. This research examines the use of complex digital formats, dissemination methods commonly used within digital heritage content, and how these can cause accessibility issues for disadvantaged groups. Through official reports on internet usage and cultural heritage engagement, this research identifies the groups least likely to engage with digital cultural heritage in Scotland. Focusing on older adults, the research investigates the complex reasons behind low levels of engagement, exploring inadequate digital literacy and age-associated decline in cognitive function. Research shows that use of smartphones can support healthy cognitive ageing older adults (Wilson et. al., 2021), but many older adults are less receptive to digital technologies on account of small screens and text sizes, overcomplicated systems and continuous upskilling requirements (Pirhonen et. al., 2020). To demonstrate the research of the literature review, a digital heritage smartphone application was made specifically for older adults. The design of the application considers the accessibility needs of older adults when engaging with digital heritage content, such as supporting contextual information, explicit instructions and larger text sizes and touch input targets. The application is thematically centred on the Govan sarcophagus and aims to facilitate an accessible learning experience for older adults.

Ballad Hawking: Sharing Soundscapes of the Early Modern World

Abi Kingsnorth, Canterbury Christ Church University

The performances of early modern ballads are becoming increasingly important in ballad research. Many scholars have included music and recordings of ballads in their work. However, these recreations are typically professional recordings by professional singers in an almost choral style. Yet, research shows that ballads were almost never performed in this way.

This project therefore aims to create performances that more authentically reflect the ways that ballads would have been performed on early modern streets to explore and share the lived experience of gender nonconforming ballads. This will involve the creation of a collection of 5 soundscapes that incorporate ballads into different early modern environments.

These soundscapes will not only seek to recreate more representative performances of ballads but the environments in which they were performed in too. Early modern environments are often underrepresented, as projects typically focus on the earlier and visually distinct medieval sites, or later Victorian era developments from the industrial revolution. 3D visualisations of early modern streets and taverns made using Unreal Engine will accompany the soundscapes, which will combine singing and audio effects, to create an atmospheric heritage experience.

This combination of visual and aural techniques creates an accessible way for the public to engage with a unique part of the past. The visual soundscapes will be used to investigate how recreated performances can work as supplementary historical sources for both research and public engagement purposes. Thereby, acting as an informal way to share typically unseen cultural heritage, like ballads, which are still an active part of our society today in research and recreation.