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# Evaluating Digital Resources in Cultural Heritage

## Lessons from the ScotDigiCH network

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**Abstract**—The communication of collections information in digital form, whether it is an online catalogue, mobile application, or social media exchange, increasingly affects our cultural encounters and shapes our perception of cultural organizations. Cultural and higher education institutions in Scotland, in common with those in the rest of the world, are investing vast resources on digitization and making their collections available online but we still know very little about who uses these and how they interact with the data. In order to address this gap the Scottish Network on Digital Cultural Resources Evaluation. ScotDigiCH was initiated in January 2015 and brings together academics from different disciplines and professionals from Scotland's key cultural organizations in order to investigate how cultural digital resources are used by diverse user groups, how to record their impact on learning, research, and community engagement, and how to maximize their potential. It integrates different methodologies and perspectives (from digital humanities, computing science, museology, social sciences) and uses as a case study the Kelvin Hall Project in Glasgow. The Network has organized a series of four workshops, a knowledge exchange event and will organize an international symposium on digital cultural resources evaluation combined with a public lecture and an open public event to explore the Kelvin Hall digital collections portal. All these activities have certainly given all partners a lot of food for thought and are informing the Hunterian museum's Digital Strategy and how it takes digital curation, collections documentation, exhibition interpretation and visitor engagement forward. The paper discusses the methodology and lessons learned from the ScotDigiCH research network and the wider implication for other researchers and organizations working in digital cultural heritage.

**Keywords**—digital collections; evaluation in digital cultural heritage; impact of digital resources; value of digital resources

### I. INTRODUCTION AND CONTEXT

The use of digital technologies is affecting all aspects of our lives and is reshaping the way we communicate, learn, and approach the world around us. In the case of cultural institutions, digital applications are used in all key areas of operation, from documenting the collections, interpreting and exhibiting them to communicating with diverse audience groups. The communication of collections information in digital form, whether an online catalogue, mobile application,

or social media exchange, increasingly affects our cultural encounters and shapes our perception of cultural organizations.

Although cultural and higher education institutions around the world are heavily investing on digitization and working to make their collections available online, we still know very little about who uses digital collections, how they interact with the associated data, and what the impacts of these digital resources are.

### II. THE SCOTTISH NETWORK ON DIGITAL CULTURAL RESOURCES EVALUATION (SCOTDIGICH)

In order to address this gap a research network was set up in Scotland but with an international outlook, the Scottish Network on Digital Cultural Resources Evaluation (ScotDigiCH) (<https://scotdigich.wordpress.com>). ScotDigiCH was initiated in January 2015 with funding from the Royal Society of Edinburgh. This is co-ordinated by the Humanities Advanced Technology and Information Institute (HATII) at the School of Humanities at the University of Glasgow.

The ScotDigiCH network brings together academics from different disciplines and professionals from Scotland's key cultural organisations in order to investigate how cultural digital resources are used by diverse user groups, how to record their impact on learning, research, and community engagement, and how to maximize their potential. It integrates different methodologies and perspectives (from digital humanities, computing science, museology, social sciences).

The network is organized in two concentric circles: the first one is formed by the collaborating partners, who have more regular contact. Their location in the same city, Glasgow, allowed regular meetings without unnecessary expenses and combined their complimentary expertise to study in depth the specific case study. The second circle includes: a) experts from around the world who bring their international perspective and knowledge on the latest developments in digital cultural resources, and b) cultural heritage professionals from Scotland and beyond who bring in different perspectives of collections, users and institutional contexts and benefit from the knowledge exchange of this project.

### A. The Kelvin Hall Redevelopment Project

ScotDigiCH uses as a case study the Kelvin Hall (KH) Redevelopment Project in Glasgow, one of the most ambitious collaborative cultural projects in Scotland [1]. The KH project has brought into partnership three leading cultural institutions: The Hunterian of the University of Glasgow; Glasgow Life museums, the network of museums of the City of Glasgow; and the Scottish Screen Archive of the National Library of Scotland with the aim of co-locating their collections in one of Glasgow's landmark historic buildings, but also the digital records and resources related to those. This brings together civic, university and national heritage collections for the first time in Scotland and offers new opportunities for object-based learning (in both the physical and digital context), research and community engagement.

KH also offers a unique opportunity to investigate the use and impact of cultural digital resources from different disciplinary and methodological perspectives which is the focus of the ScotDigiCH network. ScotDigiCH examines the challenges and questions raised by the Kelvin Hall project and the use of digital technologies to bring together diverse and extensive collections, support in-depth research and scholarship but also make them more accessible and easy to use for a wide range of users. The ScotDigiCH network links researchers studying the use of digital media in the cultural sector with stakeholders and cultural professionals working in partnership on the Kelvin Hall project. This allowed the grounding of the research themes on the real working practices of the cultural sector and the examination of the research questions in a focused project which combines a wide variety of users, types and size of collections, and institutional settings, academic, civic, and national.

### B. Research Network Aims

In order to address the wider challenges about the creation, curation and use of digital collections in the cultural sector, as well as the specific ones that the Kelvin Hall project raises, ScotDigiCH focused on the investigation of the following research questions:

- Who uses the digital materials that museums, libraries and archives spend so many resources to produce?
- How do they use them, where and why?
- How are these resources re-used, re-interpreted, re-integrated in the users' own projects and digital networks?
- How can cultural organisations record and assess more effectively current digital use so they can plan their future digital strategies?
- How can we work more closely with different audiences to create digital collections and resources that are relevant to them and support them as individuals and members of diverse communities?
- How can we record and assess impact and value of digital cultural resources?
- What are the implications for policy and future strategies

### C. Methodology and work plan

A work plan was designed in order to address the research questions and bring together the experience from both the cultural sector and the research communities working on these topics. This included over a period of two years from December 2015 a) the organization of four workshops addressing four key research areas, b) a knowledge exchange event with cultural heritage professionals in order to diffuse the lessons learned from the network and receive feedback, c) an international symposium (organized in Glasgow at the end of the project in December 2016), and d) a public lecture and an open evening at Kelvin Hall exploring the digital collections [2].

The methodology for the workshop placed great importance in audience participation and dialogue among participants. After the presentation, workshop participants broke down into small groups of about 8-10 to share and discuss their experiences working with digital resources, and strategies used to assess the impact and value of these existing models (Fig. 1). It is here that participants had the chance to bring ideas to the table and set the agenda for future events organized by the Scottish Network on Digital Cultural Resources Evaluation. A moderator was assigned to each group and after the group work discussions, the moderators (with the help of group members) presented briefly to the plenary the results of their discussions. The group coordinator then summed up the key themes emerging from both speaker presentations and group discussions. There was live tweeting during the workshops and the presentations and discussions were video-recorded and put on the ScotDigiCH YouTube channel.



Fig. 1. Groupwork at Workshop 2: Crowdsourcing, co-curation, co-creation, Glasgow 1 December 2015

1) *Workshop 1: Models for providing digital access to Scottish cultural heritage information:* This workshop examined the different models and approaches in providing access to digital resources in Scotland over the past few years and assessed their success. It looked at the particular organizational setting, type of collection and targeted user group of each approach and how these affected digital resource design. Representatives from Scottish cultural organisations and initiatives which were instrumental in the digitisation of collections, such as SCRAN (the Scottish Cultural Resources Access Network) [3], the University Museums in Scotland (UMIS) group [4, 5] and the team which developed Collections Navigator for Glasgow Museums, were invited to reflect on the lessons learned from these projects and how they can help us plan future ones effectively.

After the presentations participants were invited to reflect on what they thought had been some of the successes — but also failures — of past initiatives; what issues need addressing in order to provide resources that meet the diverse needs of users and those working in the cultural heritage sector.

2) *Workshop 2: Recording user needs and motivations. Crowdsourcing, co-curation, co-creation in the cultural sector:* This workshop looked at the end user of digital resources as central in the design process and examined a number of related questions. What are the different users' expectations from online digital resources? How can cultural organisations serve a diverse user base that ranges from young children to experienced researchers? How can we include non-users in our research and identify barriers to access, particularly if they are part of the targeted audience? Are the traditional user groupings effective or do we need to examine alternative ways of categorizing audiences? How do we feed the user needs analysis to the design process? How effective have participatory design approaches been and how can these be integrated in the organisational culture? After receiving feedback from the participants of the previous workshop, it was decided to focus particularly on crowdsourcing, citizen science, co-curation and co-creation questions.

3) *Workshop 3: Evaluating use and impact of digital cultural resources. Discussion of methodologies:* How effective have particular methodologies proven in answering questions about the use of digital resources and their effect on learning, research and engagement with the collections? Which combination of quantitative and qualitative methods is better suited to this type of research? What are the latest developments in analysing online usage data and eye-tracking and how are these combined with ethnographic approaches? How can we move from recording how to understanding why users are interacting with digital resources in particular ways? What are the appropriate tools and limitations in analysing social media data about engagement with the collections?

4) *Workshop 4: Moving from impact to value when assessing digital cultural resources:* The recent socio-economic developments have placed increased pressure on higher education and cultural organisations to demonstrate the impact of their digital resources and initiatives. Until recently this has placed an emphasis on quantitative indicators and has raised concerns about the difficulties of capturing the real

value of cultural assets and the complex and multifaceted ways in which they affect diverse users. Should we move away from recording impact and focus our efforts more on capturing the value of cultural collections? What are the implications for sustainability and strategy in this process? And how can this be implemented in practice, incorporating rich qualitative data but maintaining robustness and ensuring comparability in our analysis?

5) *Knowledge exchange event with cultural organisations from Scotland:* This was a day event co-organised with one of the key policy makers and cultural providers in Scotland, Museums Galleries Scotland, and particularly their recently formed Digital Transformations Group. Its aim was to disseminate the findings from the network and examine how they can feed in the design of effective digital cultural strategies which meet users' needs. This addressed a real need in the cultural sector for guidance on how to best direct limited resources on digital engagement and use them most effectively. After feedback with the network users it was decided to focus on crowdsourcing and open knowledge models.

6) *International symposium on digital cultural resources evaluation:* This is planned to be held at the Kelvin Hall lecture theatre (soon after it opens in the autumn of 2016) towards the end of the project to bring together the main questions and issues raised from its previous activities and is aimed at both researchers and digital heritage professionals.

7) *Public lecture and Collections Open Evening:* The symposium is followed by a public lecture also hosted at the Kelvin Hall lecture theatre and will be combined with an open public event to explore the KH digital collections portal. These are addressing a broader audience beyond academia, including local communities and will allow the results of the network to be diffused more broadly.

### III. LESSONS LEARNED

The ScotDigiCH network succeeded in attracting a combination of researchers and cultural heritage practitioners in all the workshops and events organized until now. These also covered different career levels from postgraduate students and researchers to directors and managers of cultural organizations. There was a good mix of ages, specializations, fields and experience in different aspects of digital creating and curation and cultural heritage. A large part of participants was based in Scotland or North England, but the geographical mix had quite an international profile with several European and some international countries represented.

Although the workshops were initially planned for about 30 participants to allow for small group work and discussion, in the end all workshops were oversubscribed, indicating the interest in these issues and the gap in existing research. For workshop 1 we felt it was important to open it up to everyone interested in this area and the emerging topics, so we accepted everyone on the waiting list. We had about 60 people in the room and quite a few more following from twitter.

### A. Workshop 1

The speakers (in physical and virtual presence from afar as we had one presenting with video-conferencing) explored in a critical way the challenges that some of these digital cultural heritage projects faced and highlighted some common issues, such as the importance of collaboration between institutions and of listening to users and bringing them onboard early on and throughout the process of designing these tools and resources. The groups worked hard after the presentations discussing the questions given to them and exploring the issues highlighted by the speakers. The reports back from the moderators were all extremely useful and informed the planning of the later events.

### B. Workshop 2

In workshop 2 on Crowdsourcing – Co-curation – Co-creation in Cultural Heritage held at the iconic Lighthouse venue, the speakers used a wide range of examples and analyzed honestly and thoughtfully the lessons learned from their experience with crowdsourcing projects.

Mia Ridge (Digital Curator, British Library) opened the sessions with an overview of the different approaches and main issues in crowdsourcing so-far [6]. “Think of it like inviting people to your home.... so don’t lock yourself in the kitchen” was one of the memorable quotes that touched on the heart of the user engagement and volunteer management questions for cultural institutions. Andrew Nicoll from the recently re-named Historic Environment Scotland talked about the experience from SCRAN, MyCanmore, Scotland’s Places, and Britain from Above projects and the varied levels of engagement, curatorial involvement and type of approach these range [7, 8]. “Better to start small and evaluate first before spreading to a huge crowd” was his advice for organizations wanting to try crowdsourcing.

Andrew Greg talked about crowdsourcing around paintings’ collections based on the experience of the well known YourPaintings project [9] (whose BBC website will be relaunched as Art UK in 2016) and Art Detective which tries to engage the public in discussions about art and history. Interesting to note how a small number of users contribute most of the content.

Milena Dobрева (University of Malta) and Fred Truyen (KU Leuven), who couldn’t make it to Glasgow and joined the workshop from Belgium via video, talked about the EU Civic Epistemologies project and the differences between citizen science and crowdsourcing. Important issues to explore in this direction are the diffusion of innovation, the challenges in combining the roles of different stakeholders and managing users’ expectations. The project (<http://www.civic-epistemologies.eu>) has prepared a roadmap defining the main steps to bring citizens and their associations into the research processes of digital cultural heritage [10]. The project at its recent November conference also proposed the Berlin Charter, (<http://www.civic-epistemologies.eu/berlin-charter>) a set of principles for encouraging citizens’ engagement in cultural heritage and humanities research in the digital age.

Maarten Brinkerink from the Netherlands Institute of Sound and Vision (NISV) explained how the organization’s

three main aims of being smart, connected and open fit well crowdsourcing principles. He described how different crowdsourcing typologies are used at the NISV, following the digital content life cycle. So, for example, he outlined the experience of using games with a purpose for tagging and classification crowdsourcing tasks, such as the video-labelling game asking users to contribute fine-grained tags matching controlled vocabularies or the one where users have to type what they hear and see to score points. Crowdsourcing is also used for collections acquisitions, for example in the Sounds of the Netherlands project and for collaborative sound mapping, as well as for contextualization, correction and transcription, co-curation and crowdfunding.

The afternoon group work session brought up and explored in greater depth several issues raised at the talks, such as: the question of terminology and the differences between crowdsourcing and citizen science, the need for new set of skills for managing effectively such projects, the pressure these put on resources but also organizational culture and mentality, the need for clear objectives when embarking on such initiatives and whether the emphasis is more on data input or community engagement (or can it be both?).

### C. Workshop 3

Workshop 3 on evaluating use and impact was hosted by the University of Strathclyde and brought together speakers and participants from a range of cultural heritage areas and academic disciplines in a convivial atmosphere for fruitful exchange of experiences.

Jen Ross (Lecturer in Education, Community and Society and Co-director of the Centre for Research in Digital Education, University of Edinburgh) talked about Artcasting (<https://www.artcastingproject.net>), an AHRC-funded project which is developing, testing and assessing a new digital mobile platform for evaluating arts-based engagement, using as a case-study the ARTIST ROOMS On Tour [11]. One of the project’s research questions examines how can a mobilities’ approach which asks visitors to make connections between art and place constitute meaningful evaluation practice. Artcasting is using qualitative methods and a design-based approach to generate, pilot and evaluate Artcasting prototypes. These methods include interviews, workshops with young visitors, iterative design of the Artcasting application, in-gallery observations, and analysis of usage data and user-generated content shared by Artcasting users. Jen showed aspects of the rich material collected from users through the Artcasting app that is still being analyzed and raised interesting questions about the use of the digital platform itself as a method of evaluation for understanding engagement with art.

Staying with the theme of mobile interpretation and engagement, Areti Galani (Lecturer in Museum and Heritage Studies in Media, Culture, Heritage at Newcastle University) talked about experience-driven evaluation methods for mobile cultural applications. She referred to the situated, personal/private, and dynamically constructed nature of the ‘felt experience’ of heritage and art apps and the importance of understanding the process of sense making that users go through when using them. She presented two quite different

case studies which they evaluated, the Rock Art on Mobile Phones (RAMP) web app and the Second Moon art app [12, 13]. Unlike Jen's Artcasting example which focused on engagement in or stemming from the art gallery space, both of Areti's examples focused on the every day experience of heritage and art in an outdoor setting.

The first one studied rock art web apps in rural Northumberland to evaluate whether the app supported the discovery of rock art, speculation about its meaning and a sense of place. It used ten self-selected participants, which the researchers shadowed on site while they were using the app, debriefing qualitative interviews and mind maps based on prompts (Fig. 2). This qualitative in-depth approach provides a rich and deep understanding of the nature of the users' experience and how they constructed meaning and used it in their exploration.

The second study that Areti presented on the Second Moon was an art project by British artist Katie Paterson that was commissioned as part of the British Science Festival in 2013. The evaluation used again a small sample (7) of self-selected app users who were asked to keep an online diary using Google docs. As with the previous case, it was impressive to see the depth and richness of the self-reflective information users volunteered and how they allowed the researchers to see the 'felt experience' of the app in action and the ways they appropriated the technology. Areti highlighted the lessons to be learnt from these studies, including the observation that good usability does not necessarily equate with a meaningful experience but meaningful experiences require good usability.

Moving from qualitative approaches to evaluation methods that can capture large quantities of data, the next presentation focused on eye tracking and gaze analysis. Jan Hendrik Hammer (Fraunhofer Karlsruhe Institute of Technology) explained how eye tracking and gaze analysis can help us understand gaze-based interaction and highlighted its potential and limitations in cultural heritage evaluation. He outlined the type of investment in hardware and software, as well as the skills involved in analyzing the data, which might pose limitations for smaller cultural heritage organizations. Jan used the case study of the ArtSense project and the Valencian kitchen display of the National Museum of Decorative Arts in Madrid where eye tracking was used to compare where visitors' attention focused and points of interest when the

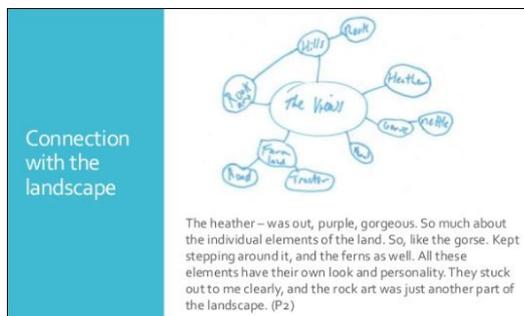


Fig. 3. Mind map used in the evaluation of the Rock Art Mobile app – from the presentation of Dr Areti Galani, University of Newcastle, on experience-driven evaluation of heritage/art mobile apps, Workshop 3: Evaluating Impact and Use, Glasgow, 31 March 2016

explored on their own and with an audio-guide [14]. He also referred to the use of eye tracking via webcams where no eye tracker is needed and can involve online users from around the world, using the example of Glasgow's well-known landmark of the Duke of Wellington statue in front of the Gallery of Modern Art, where it is obvious that the users focus on the cone on his head (Fig. 3). This webcam use of eye tracking has considerable potential for user interface analysis for online digital libraries and websites. His talk raised an interesting discussion about how eye tracking and gaze analysis help you record where the users and visitors are actually looking but not necessarily understanding the reasons for doing so and their type of engagement.

The last speaker, Professor Paul Clough from Sheffield University School of Information, talked about the evaluation of information searching in digital cultural heritage. He looked at the question of what makes a search system successful and the different criteria used to evaluate this (like the retrieval of relevant documents, user interaction support, user satisfaction, impact on the wider user environment) and remarked that the answer actually depends on who you ask, the users and the context. This is even more important in cultural heritage settings. Most typical in information retrieval evaluation, the focus is on the quality of the search results but as many search-based applications are typically rich in features, it is necessary for evaluation procedures to move beyond studying just the search box.

Clough presented the lessons learned from the study they carried out of the European PATHS (Personalised Access To cultural Heritage Spaces) project [15]. This developed techniques to support expert and non-expert users navigating and using cultural heritage materials from *Europeana*. It also investigated the use of trails/paths to facilitate narrative-like structures through digital collections for use as guides and learning aids (like exhibitions/guides in physical space). The evaluation activities in PATHS covered a range of approaches and perspectives, ranging from evaluations carried out by researchers to select best algorithms, evaluations carried out by user interface designers and evaluations of the integrated

**Further Interesting Stuff**

- Stationary eye tracking via webcam ([www.eyezag.de](http://www.eyezag.de))
  - No eye tracker needed
  - Subjects can participate from all over the world

RealTime 2D Data Analysis in WebVR Applications
35

Fig. 2. Use of eye tracking with webcam using the Duke of Wellington statue outside the Gallery of Modern Art, Glasgow, Jan Hendrik Hammer's presentation, Fraunhofer Karlsruhe Institute of Technology, Workshop 3: Evaluating Impact and Use, Glasgow, 31 March 2016

prototype by end users both in controlled lab-based user testing and field trials. He identified the challenges they faced when ‘thinking outside the search box’, including sharing evaluation practices between domains and disciplines. This was a useful point to remember when working with the diversity of material and interdisciplinary nature of digital cultural heritage.

During the group work, five different groups explored the participants’ own experiences of evaluation in this area and the advantages and limitations these brought. Some of the issues highlighted at the plenary at the end was the need for a balance between quantitative and qualitative methodologies, the lack of a single golden evaluation method, the importance of integrating evaluation in a life-cycle from the beginning of a project and not bring in as an afterthought, but also moving from projects to integrate evaluation work in everyday practices of organizations and getting institutional support at all levels.

#### D. Workshop 4

Workshop 4 moved these questions forward focusing on the debate about moving beyond impact to examine the real value of digital cultural resources and how they affect different users.

Iain Hamilton, Head of Creative Industries, Highlands and Islands Enterprise, talked about the changing landscape and profile of the creative industry which often includes companies with very few employees often working in this field part time with a diverse skill-set and dispersed geographically. The changing technological and social landscape brings new models of working and it is important that we openly explore these. In this area, for example, specialized knowledge, preservation of oral history, local traditions, storytelling to contextualize the landscape and heritage can offer a unique boost to the economy with smaller creative industries in some case collaborating with very large corporations because of their unique content.

Professor Paul Moore, Head of School of Creative Arts, Ulster University talked about Arts data and the cultural value these can bring using as an example the 2013 report he co-authored with Anthony Lilley for the NESTA and the UK Arts and Humanities Research Board on ‘Counting what counts. What big data can do for the cultural sector’ [16]. This included a study of the way data were used at the Audience Agency, the Barbican, the English National Opera and the National Theatre. The study showed that creative industries were often unaware of the huge potential of big data and that technological changes were insufficient if they were not combined with changes in the organizational culture (Fig. 4). It also highlighted that the use of digital data could change the power relationships within the organisation with workers previously at the bottom of the hierarchy acquiring new power when they were the ones handling the digital data and understanding its potential.

Dr Tytti Steel, Postdoctoral Researcher at the Social and Economic Sustainability of Future Work-life (WeAll) Consortium (<http://www.weallfinland.fi/weall-home.html>), University of Helsinki talked about moving from Impact to Value in Finnish Digital Cultural Heritage and

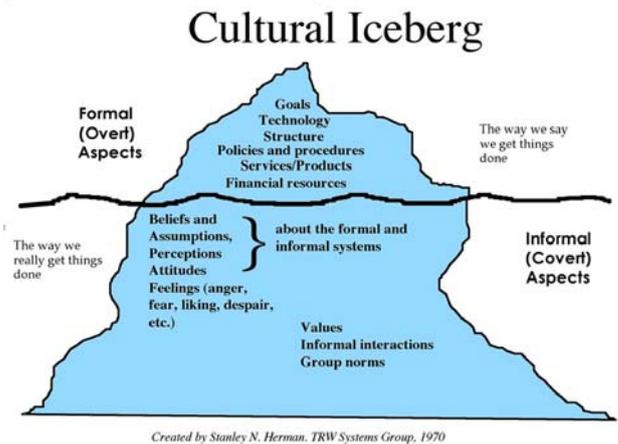


Fig. 4. The cultural iceberg model used by Prof Paul Moore, School of Creative Arts, Ulster University, to explain the use of big data in the cultural and creative industries sector, Workshop 4: Moving from Impact to Value, Glasgow, 16 June 2016

outlined the main ICT developments in the Finnish cultural sector. She observed that the language about impact and value might vary, but the questions around what sort of difference and how much of a difference cultural institutions are making are the same. Three key things we can learn from the successful game designers are 1) the active role of the user, 2) that doing things together is important, and 3) the total freedom to do what you want which suits Digital Heritage as it gives this freedom without destroying the original.

Harry Verwayen, Deputy Director (Management) of Europeana ([www.europeana.eu](http://www.europeana.eu)) talked about the complexities of and the drivers for evaluating impact for an ambitious and political project of the scale of Europeana. He explained how they use the balance-value-impact model proposed by Simon Tanner (Kings College London) [17] and the challenges of untangling what meaning these three terms take within the organisation. He described how they tested the model with a case study of materials from War World I and a survey they carried with Europeana users in Poland and the Czech Republic. The data are still being analysed but gave the organisation food for thought about how value is perceived by real end users and the areas where they see this applied.

#### IV. CONCLUSIONS AND FURTHER WORK

The network highlighted that there is an important gap in understanding better who uses digital collections and tools in the cultural sector, how these are being used and what the impact and value of these interactions are. More research and work is needed to investigate these questions. ScotDigiCH showed that there is not single golden methodology or model to be followed in this direction and that collaboration among cultural heritage organisations and researchers is crucial.

Despite the breadth and depth of digital engagement of cultural organisations and the immense variety of approaches and scale, some of the fundamental questions which still need to be answered remain the same. Sharing honestly and openly failures and frustrations, as well as successes is important in this direction. Working collaboratively not only with other

organisations and partners but also with end users is also one of the major shifts of the last few years. This requires a shift in our thinking and working practices but also training and policy. There are also very important policy implications related to questions of impact and value of digital resources. In order to address these appropriately it is important to open the dialogue, the way ScotDigiCH started, about the best way to record these but also the hidden agendas that are pushing cultural organisations to prove them.

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