Capture, Processing and Presentation of Digital Cultural Items: Feedback from cultural heritage practitioners

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Abstract

The trend of digitizing analogue artefacts from cultural heritage collections to create cultural digital items remains ongoing. The user experience of Cultural Heritage Practitioners (CHP) should be understood in order to support academic efforts in producing practical contributions that benefit those working with cultural digital items. In this publication we follow a series of semi-structured interviews with 10 CHPs and supporting technical professionals who work with cultural digital items on a daily basis. We then code their responses for theme, analysing their thoughts and concerns regarding key topics connected to cultural digital items such as interactivity and the challenges of digitization within the culture heritage sector.

CCS Concepts

• Human-centered computing → Human computer interaction (HCI); • Social and professional topics → Cultural characteristics;

1. Introduction

Digital curation has embraced digital technologies in an effort to engage with visitors in both real world locations and online. The perception of museums has moved from them being regarded as guardians of cultural collections and towards providing experiences that inform and educate [Bla12, HG13, NBE17]. Digital cultural items, whether they are generated from analogue items or 'born digital', have become an increasingly important tool in the cultural heritage practitioner's tool box. This is irrespective of whether they are part of online collections, shared interactive stories or virtual recreations of cultural sites [GFE19].

With the COVID-19 pandemic restricting movement and public gatherings, many cultural heritage practitioners have found themselves required to generate more digital content from their collections. Digital cultural items offer many advantages, with the potential to increase accessibility, to be capable of integration in a variety of exhibitions and to provide levels of interaction not feasible with their analogue counterparts [GCR17,GFD09]. While many institutions are involved in digitizing their collections, the artistic, technical and social challenges of preparing and presenting digital cultural items, as well as engaging with dynamically changing technologies that render them possible, is the responsibility of individual cultural heritage practitioners (CHP) [PGMBR17].

And yet, efforts to understand those using collections and applications plus the associated data and the value they place on digital resources have primarily focused on the user or systems adopted by institutions, leaving the "voice" of the cultural practitioner "surprisingly silent" [DRH19].

In this publication we explore how the increasing trend to digitize and the push to engage with a rapidly changing set of technologies affects the everyday experience of the CHP and the supporting professionals they work with, who help realize cultural heritage projects through skill sharing and technological support.

Moreover, this publication seeks to better understand the challenges facing CHPs and the professionals that support their projects by focusing on their experiences as they continue to tackle issues of generating, managing and working with digital cultural items, with the intent of guiding future research efforts to better support the work of CHPs working with digital cultural items.

2. Background

2.1. UX

The study of UX was initially shaped by Donald Norman who, after the publication of his book, 'The Psychology of Everyday Things', brought the term 'User Experience' to the forefront of design research in the mid-1990s during his employment with Apple [Nor88].

Early studies in related fields focused on such notions as usability, productivity or learnability [HT06] with a drive towards an instrumental, task-orientated view of products [FB04]. Specifically, within the study of Human Computer Interaction, UX represents a concerted shift from focusing solely on the instrumental and towards considering the human within the interaction and hedonic qualities including the sensual, cognitive, emotional, aesthetic and the ethical [FB04,PLF*18]. If the questions before were 'How does

a user do this? How can we improve a user's doing of this?' then today the questions have become 'Why does a user do this? How can we improve the doing of this for user?'

The ubiquitous field of UX [PLF*18, Bar19, RLW18] has grown since the 1990s to engage with a wide range of practical applications, from theme parks [TZ12], to catering [Jia20] and of course to software design [LA14]. With such a wide range of applications, the meaning of the term 'User Experience' has been questioned, challenged and studied [HT06, FB04] by scholars. As with any field of research, numerous trends have arisen [KC20]. An important trend to consider is the 'gap' between theory and practice, typically between academics seeking to contribute by furthering knowledge and professionals who must apply theory to day-to-day practice [GFE19]. As with the debate concerning the extent of the gap between academic and professional theory and practice, solutions for 'bridging the gap' are varied, as are the efforts to understand which skill sets better align with the goals of academics wishing to support practitioners through their research efforts [GFE19, TAR20].

2.2. UX and CH

Like UX, the term 'cultural heritage' and what it denotes is wide ranging and can be found in one person's efforts to preserve and share artefacts from a local village [CHM17] all the way to the efforts of institutions such as the British Library and Tate Gallery [YEW*12, IA18]. The inclusion of computer based technologies has increased over the decades, starting with cataloguing collections, before moving on to networking resources between institutions globally. Efforts continue to leverage computer technologies in order to digitize collections and place them 'online', for reasons such as the preservation of the original analogue item to increasing accessibility for visitors and education [IA18, PMG*20].

The resources available to a given CHP can vary considerably, as does their access to the various skill sets required to take an item from the analogue to the digital, yet they all typically share the responsibility of curation at their core. Accordingly, while research involving digital cultural items and their curation can focus on exploring and developing 'high-level' theory to better apply learnings from UX research [FB04, PMG*20, CdLPP19], practitioners require practical, actionable information [HT06, HWB*19], such as understanding how researchers locate and use cultural items [FB04] or manage the data that supports them [AMP*17, DTM17].

As with UX theory, understanding what is valued, what is of concern and how a user feels about a given system plays an important part in informing and shaping the efforts of those working with digital cultural items within the cultural heritage sector, where applying UX theory has helped to improve many projects and initiatives [KC20]. The challenges involved in creating, managing and making best use of digital cultural items can be considerable, placing cultural heritage practitioners under considerable pressure to get the best results and return from each investment, in both time and money.

2.3. Digital Items & CH

It can be argued that practically every project which involves visitors interacting with a digital cultural item includes an aspect of education within the experience [GFE19]. As such, Cultural Heritage practitioners continue to explore ways of presenting digital cultural heritage items in ways that seek to inform and educate [TAR20]. Such projects include using VR to recreate experiences or AR and MR to augment real-world locations or provide locative context to sites and cultural items [CHM17, YEW*12, IA18].

2.4. Capturing, Preparing

CHPs are faced with a landscape of ever-shifting technologies when seeking to engage with practices that capture, prepare and present digital cultural items, be they from an existing collection [PMG*20], on land [CdLPP19] or even underwater [AMRY18]. As well as the efforts to better understand the process of capturing and displaying digital cultural items [PRR*12, LPC*00], there are studies that focus on understanding what the various technologies can offer cultural heritage professionals and explorations into the practical implementation of emerging technologies and practices [IA18, GLKGDIO19].

2.5. Understanding Users, Visitors & Practitioners

While there have been efforts to address the 'user' of user experience, with regards to cultural heritage, most scholarly efforts focus on either the user as the visitor to a museum or cultural site (user-as-visitor) [KPV*20, JTL19, GK19] or on the systems used by institutions, such as websites and web-based experience [GFE19]. Studies that engage with CHPs are less common and typically rely on questionnaires rather than face to face interviews or include one or two CHPs as part of a cultural heritage related project, rather than choosing to engage with them directly in order to elicit their thoughts, feelings and values regarding cultural digital items [IA18].

In this publication we aim to provide an original contribution through offering insight into the experience of CHPs working with digital cultural items, including their creation, management and presentation, in order to support future research efforts aimed at improving technologies and practices relating to digital cultural heritage from a CHP-as-user perspective.

3. Methodology

The study comprised of 5 cultural heritage practitioners (CHP), each with a background in either curation of cultural items and 5 supporting professionals (SP) who collaborate with cultural heritage practitioners on projects involving digital cultural items. The CHPs and supporting professionals were selected from various institutions within the UK and included museums, universities and private companies.

A semi-structured interview was undertaken to provide information on each participant's experiences of working with digital cultural items. The semi-structured interview technique offered the flexibility for the researcher to explore and expand on topics as they

naturally arose during the interview, while also providing a focus for questioning that allowed the interview to be completed within a time better suited to the busy schedules of the professionals involved. The interview questions were designed to provide insight into CHPs and SPs perception and experience of working with digital cultural items, their role within cultural heritage curation and the challenges involved when working with them. Further questions were included to better understand the role of interactivity when applied to digital cultural items, its impact on the user experience as perceived by the CHPs and SPs, plus the challenges involved when working with interactive digital cultural items.

3.1. Participant selection criteria

Each participant was contacted either directly or through a network of professional associates working within the cultural heritage sector. Participants were each required to be curators working with digital cultural items within the cultural heritage sector or supporting professionals with experience working with digital cultural items on cultural heritage projects. The participants were not expected to be experts in capturing or displaying digital cultural items but were expected to have some familiarity with the processes involved. Participants were professionals based in the UK and selected for their work with digital cultural items within the cultural heritage sector.

Professionals working within the cultural heritage sector were given preference over academic candidates due to the study's aim to better understand the experiences of those working 'day to day' with digital cultural heritage items.

3.2. Coordination

Over a 4 month period spanning 2020 to 2021 participants were recruited via email. Each participant was given information regarding the study's intent and after consenting, arrangements were made to conduct the interview online due to the COVID-19 rules governing social distancing in place across the UK at the time. Each interview was hosted by a video conferencing tool of the participants' choice, with all participants choosing Microsoft Teams. The individual interviews lasted between 30 to 50 minutes and were recorded using a free version of OBS Studio, and conducted at a time that best suited the professional schedule of the participant. Prior to the interview each participant was sent a copy of a video titled 'The Interactive Mask Project' [NGS20], which showcased a project involving digital cultural items and AR, where the use of facial recognition technology provided the user with the simulated experience of the wearing of a theatrical mask. The video demonstrating this form of interactive 'wearability' was shared in order to support the interview process by providing an initial 'talking point', serving as a show-case of the authors' personal experience working with cultural digital items, and creating a common ground upon which CHPs, SPs and the authors could compare and share their experiences.

3.3. Interview structure

The semi-structured interview questions were designed to elicit a participant's thoughts regarding digital cultural items and interac-

tivity with them across three key questions, each with their own respective sub-questions. The first section of questions focused on digital cultural items and asked for each participant to provide their own definition of what a digital cultural item was before moving on to questions regarding how digital cultural items were used, the challenges they presented and how such challenges could be overcome.

The second section built upon the first, introducing interactivity into the conversation with questions designed to better understand each participant's use of interactivity and the digital cultural items they work with plus the challenges they faced using interactive digital cultural items. The final set of questions focused on a specific form of interactivity based on the short video shown to each participant when the interview was conducted. These questions pertained to The Interactive Mask Project and the user experience created, with the participant being asked to imagine applications of such technology in future works.

As each interview progressed, the researcher was free to direct enquiry towards specific topics. Over the series of interviews emphasis was placed on digital cultural items created from analogue cultural items via digitization as these involved a complete pipeline, from creation to preparation and then curation.

3.4. Data Analysis

All recordings were transcribed verbatim using an automated transcription service before being individually reviewed by the researcher. While each interview was transcribed verbatim, repetition, stuttering and broken sentences were edited for ease of comprehension. In total, the transcriptions reached 70,000 words which were imported into qualitative analysis software (NVIVO) for codification. Thematic codification followed the inductive method where codes arose directly from the survey responses. Throughout the process, emphasis was placed on identifying themes for their relevance to the experience of working with and making use of digital cultural items. The codes received three passes, with the first intended to identify general themes, the second to clarify and structure the identified codes before the third pass where, finally, redundant codes were removed.

4. Thematic Analysis

Three main themes resulted from analysis: Experience, Digital Items and Interactivity. These themes are described along with their connected themes and shown in Table 1, Table 2 and Table 3.

4.1. Experience

The theme of experience encompassed aspects relating to each participant's experience of using digital cultural items in cultural heritage projects, in what way, plus comparisons between the experiences created with digital cultural items and their analogue counterparts.

Within the theme of Experience every participant reported using digital cultural items to educate in some form or another. Of the 71 individual instances recorded, 60% of participants reported using

Experience		
Sub-Theme	% Participants	References
Learning & Teaching	100%	71
Storytelling	60%	26
Considering the user	80%	40
Need to improve UX	100%	87
Improve interactivity	50%	16
Improve technology	30%	4
Improvement over analogue	90%	57
Supporting the analogue	60%	7
Replicating the analogue	30%	8
Screen-based	100%	52
Immersive Technologies	70%	19
Augmenting real-world locations	30%	4

Table 1: *Experience*

digital cultural items to inform and/or educate through the means of storytelling, with 26 references.

Regarding the user experience, 80% of participants reported the importance of considering the user, with 60% of participants expressing the need to improve the user experience for users engaging with cultural digital items. 50% of participants expressed the need to improve the various methods of interaction with digital cultural items, while only 30% commented on improving specific technologies or practices, such as increasing display resolution or improving the testing of existing display systems.

When digitizing cultural heritage items for curation, comparisons to experiences offered through use of the original analogue counterparts were made by most (90%, 57 references) participants, with the general consensus being that digital cultural items offered improved experiences, replacing the analogue cultural item. There were far fewer references from fewer participants (60%, 8 references) regarding digital cultural items supporting their analogue counterparts, for example, providing a digital copy of an analogue cultural item for directing a visitor's attention to details of the original analogue item. Finally, only 30% of participants referred to the digital cultural item in terms of replicating the experience a visitor might have with the analogue cultural item.

Of the participants interviewed, all referred to experiences framed by screen-based technologies, including screens used in personal computing systems as well as those found in virtual, augmented and mixed reality experiences. Of the 33 references relating to screen-based technologies as the site of experience, 36 specifi-

cally focused on the use of the internet, under the sub-theme of 'online', while 70% of participants talked of using one or more immersive technologies, such as VR, AR and MR. Sketchfab was referred to by 50% of participants as the platform for hosting and displaying digital cultural items.

Experiences reliant on real-world cultural items were discussed by half of the participants with 30% referring augmenting real-world cultural heritage sites and items from collections. Over the course of the interviews additional attention was placed on enquiring into experiences with virtual museums, digital environments that not only feature digital cultural items but are themselves entirely digital. However, only 20% of participants offered any mention or reported having had experiences of such platforms.

4.2. Digital Items

The main theme of Digital Items included the sub-themes: Definition of Digital Items, Pre-Digitization and Post-Digitization, where a digital version of the original analogue cultural item now existed and a number of connected themes, as shown on Table 2.

Digital Items		
Sub-Theme	% Participants	References
Defining digital items	100%	32
Accessibility	90%	122
Cost of process	80%	24
Interoperability	90%	47
Requiring specific skills	100%	122
Overcoming spatial or physical barriers	80%	43
Efforts by iiif	30%	4
Sharing	70%	14
Chosen by 3rd party	20%	3
File formats	40%	27
File sizes	50%	11
File metadata	40%	8
Acquiring funding	70%	31
Digital item manipulation	60%	23
Reliance on 3rd parties	70%	18
Priority by request	30%	9
Changing technology	70%	19
Storing digital items	50%	6
Academic efforts	20%	3

Table 2: *Digital Items*

In general, most (80%) participants chose to offer a definition of what they considered to be a digital item. Overall, descriptors such as "interactive", "something that has been digitized" and "2D & 3D items" were being commonly referred to amongst the SPs, while the CHPs had a tendency to employ more nuanced language, such as the distinction between something "born digital", where no analogue counterpart exists, compared to a digital item generated by digitizing an analogue cultural item.

Interview responses regarding pre-digitization were dominated by discussion relating to issues of acquiring, managing funding and justifying funding, with 31 references from 70% of participants. Only 40% of participants talked about the decision-making process surrounding which cultural items are chosen for digitization, with sub-themes of digitizing on request, the challenges of choosing what to digitize when collections contained many cultural items and how 3rd parties influenced what was digitized when they were a key provider of funding; all together only totalling 16 references.

The use of cultural digital items overshadowed all other codes with 357 references and was coded as 'post-digitization' which included cultural digital items 'born digital' as well as digitized from analogue cultural items. To better manage such a large number of references, the theme was divided into Advantages of Digitization and Disadvantages of Digitization, each with its own sub-themes.

Under the sub-theme Advantages of Digitization, the greatest number of references at 114, reported by 90% of participants, was the sub-theme of Accessibility, with 'Overcoming spatial or physical barriers' comprising of 43 references and reported by 80% of participants. In this context, accessibility is referred to as being able to access a digital cultural item without having to travel to a specific location, typically via the internet. This sub-theme was further expanded upon to include themes such as 'Sharing', and how digitizing cultural items could be shared between institutions, visitors and researchers. The sub-theme of Accessibility did reveal the challenge of interoperability and despite many key initiatives to unify digital item creation, management and sharing from groups such as the International Image Interoperability Framework (iiif) community, participants still commented on the tension between technologies and those working with digital cultural items and the lack of commonly agreed upon practice in regards to 3D digital items relating to file sizes, file formats and metadata.

Regarding Disadvantages of Digitization, the most frequently reported code, discussed by all participants, was the sub-theme, 'Requiring Specific Skills', with 122 references. This sub-theme included the need to learn new technologies, the reliance on 3rd parties when sourcing skills and, perhaps surprisingly, the challenge of communicating the benefits of digitization to clients and institution management. Other sub-themes under Challenges of Digitization included once more the cost of the process, the difficulty of 3D scanning in terms of practice and the technological tools required plus the challenge of dealing with changing technologies which can lead to projects becoming redundant or even no longer accessible. Likewise, storing digital items and preserving their integrity was an issue to 50% of participants, primarily the cultural heritage professionals. Only 20% of participants expressed concern with cultural heritage efforts relating to digital cultural items made by academia, with both participants echoing the need for practical solutions.

4.3. Interactivity

The majority of references as shown in Table 3 related to Visual, a sub-theme that was employed and participants talked about any form of interactivity that relied on visual activity. The sub-theme was further refined to include themes such as Inspection, relating to how cultural digital items allow users to study them in ways beyond what is offered by most of their analogue counterparts and included themes of Spatial Information, which primarily required cultural digital items to utilise technologies such as AR or MR in order to convey information regarding an item's scale and locative context.

Interactivity		
Sub-Theme	% Participants	References
Visual/Inspection	100%	123
Visual/Spatial Information	100%	60
Visual/Environmental	70%	29
Visual/Immersive Technologies	40%	13
Visual/Reading	70%	17
Reading/Annotation	50%	11
Visual/Zooming, Rotating and Panning	60%	14
Auditory	30%	5
Connecting and Linking	30%	8
Limits of interactivity	30%	5
Call for haptics	60%	9
Group interactivity	10%	1

Table 3: *Interactivity*

Reading was reported by 70% of participants as another form of interactivity. This theme also comprised of 40% of participants who actively used Annotation to augment inspection of the digital cultural items they curate. Meanwhile, the sub-theme of Zooming, Rotating, Panning included 14 references from 60% of participants and complimented the theme of Visual and the sub-theme of Inspection as the most common forms of interaction with cultural digital items.

Auditory interaction was only mentioned by 30% of participants with only one participant reporting an interaction with a cultural digital item that primarily relied on sound. The same number of participants reporting on the use of Connecting and Linking, a sub-theme where information pertaining to a cultural digital item leads to the act of connecting, linking the user to other related cultural digital items.

Only 30% of participants commented on the limits of interactivity with cultural digital items, though all participants expressed a desire for augmenting interactions with haptic technologies, as recorded under the sub-theme of Interactivity, Call for Haptics. Finally, only one participant contributed to the sub-theme, 'Collective Interactivity', a theme created to record references where participants talked about shared interactivity with digital cultural items.

5. Discussion

The study offered insights into the experiences of CHPs and their SPs when generating, managing and working with digital cultural items. An overall trend is the continuing struggle between advancing technology and the expectation to find reliable returns from costly investments of both time and money, the need to improve the quality when working with commonly accessible technologies as well as cutting-edge technologies and practices and to maximise the opportunities for learning when interacting with digital cultural items.

5.1. Promises and Expectation

Perhaps surprisingly, cultural heritage practitioners seemingly still need to convince coordinators and peers of advantages of digitization. While those versed in the relevant academic literature might be aware of the various advantages, through preservation of the analogue cultural item to the increase in accessibility, those unfamiliar with this may not be aware of these benefits. The resources involved, including time, skill and technology can present a challenge to adopters of digitization or those wishing to create projects with digital cultural items.

Complicating efforts to secure support from coordinators and peers is the challenge of communicating the limits of seemingly ever-changing technologies, indicating a still present value in exploring ways of educating would-be supporters of digital cultural item creation, management and presentation practices and technologies.

5.2. The cost of skills and technology

Even before the COVID-19 pandemic, practitioners learned of the many challenges facing digital cultural heritage projects, especially the process of creating, managing and presenting digital cultural versions of analogue cultural items from their collections.

In order to create high fidelity digital cultural items from analogue cultural items, using technologies such as photogrammetry often requires specialised tools but the process continues to become easier, faster and perhaps critically, more affordable. Likewise, when working with digital cultural items, especially 3D digital items, the ability to manipulate digital assets is a critical skill. However, while a practitioner can invest their time and funding in learning skills for a specific technological tool or practice, this investment can often be challenged due to changes associated with the advancement of technology. Furthermore, skill sets associated with 3D digital item manipulation often take years of training to master. Ultimately, a cultural heritage practitioner wishing to engage with digital cultural curation can find themselves split between practicing the skills of curation, developing the skills required to use existing technologies and maintaining an awareness of new technologies as they arise.

In response to the CHPs requiring access to specific skill sets, the cultural heritage sector practices the strategy of promoting skill sharing through initiatives such as, 'GLAM (Galleries, Libraries, Archives and Museums) Labs', where professionals meet, network and share knowledge about digital cultural heritage projects.

Another strategy available to institutions is to acquire access to skills and technology through 3rd party specialists. However, few institutions have the luxury of investing in technologies required for digitization or can afford to keep a 3rd party specialist, let alone a team of specialists, available for a given cultural heritage project. In relation to this, one participant mentioned:

> "It gives people the ability to interact with objects and see them in a different context outside the museum. Good for access, but it's the Wild West in the sense that I don't think people have processes in place at the moment. I think that there there are moves towards it. You know there's a lot of talk about how to do that."

And while such networking opportunities and services might provide access to key skill sets, the ever-changing technological landscape presents the challenge of sustainability, with participants reporting concerns on issues such as file storage, file metadata, file formats and reliance on 3rd party support, together accounting for 28% of references considered as 'challenges of digitization'.

5.3. User Experience for practitioner and visitor

Nearly every participant showed their support for cultural digital items and considered them to be an improvement over their analogue counterparts. This is most likely due to the main advantage of cultural digital items, as reported by the study's participants, that of 'accessibility'. Digital items can be shared, copied and accessed to a far greater degree than their analogue counterparts.

> "It's worldwide, you don't have to be in the Gallery to do it, but it's obviously horrible what's going on at the moment but the brilliant thing is that we can make the items completely 3D interactive and anyone at home, anywhere in the world, can see it and interact with the same too."

One interesting area of response was the support for haptic technologies. This seems to be an interesting extension of the interactive experience by providing the opportunity for users to touch a digital cultural item, with additional learning opportunities such as appreciating texture and weight.

> "You can start incorporating haptic interactions. You can do 3D printing from these items for schooling, kids can come into the library and they can actually touch what the original is like and get an idea of what how it feels. "

With this said, cultural heritage practitioners were generally focused on improving the visitor experience when engaging with experiences created using digital cultural items before improving technologies themselves. Furthermore, different participants discussed the need for 'reducing complexity' when engaging with the various technologies and practices connected to digital cultural items, as well as a need for improving interaction.

> "And another quote from Douglas Adams is about the technology. I have to paraphrase it, but the piano, we don't call the piano technology, because it's a piano, right? Because it just works. We haven't got there yet, with the internet. And all of that is kind of still technology, we have to call it technology. I think where we'll end

up is, it'll be so effortless that it might as well just be the real object."

"How do we cut through this layer that we don't need them to know about and the way that we did it was we said to them actually you don't need to know about manifest URL's because most of the time with iif, the way you would, let's say include stuff, is use this manifest URL which is a long URL to a JSON file that says here's this item. But then you have to explain what a manifest is and explain how to report manifest and all this, so what we said actually cut through all of that and what are the key things we did."

This suggests that practitioners are more concerned with the improvement of what they have available rather than the development of new technologies and practices, especially if they require investment such as the learning of new skills which are expensive to maintain or acquire. Fortunately, there are many examples to drawn upon outside of the digital cultural heritage sector demonstrating improvements in interactivity as well as the critical need to reduce complexity when engaging with digital technologies.

5.4. Learning, inspection and space

In keeping with current practice and literature, the study demonstrated that nearly every effort and project involving digital cultural items involved, to some degree, education.

We may posit that digital cultural items, with their increased accessibility over their analogue counterparts, support self-guided learning as much as directed learning and this is apparent when we recognize the most reported style of interaction with a digital cultural item, specifically that of 'inspection'.

This is supported by the number of references regarding some form of visual inspection, with both 2D and 3D objects providing systems such as zooming, panning and rotating, allowing for a user to choose where and how they visually inspect a given item. Of interest was the discussion around annotation, which was reported as a useful teaching tool but also presented the possibility for a user to annotate an item, leaving a comment or remark, and in the process participate in a form of self-styled, vistor-centric curation available to non-cultural heritage practitioners.

When engaging with 3D digital cultural items, the various immersive technologies that are commonly the focus of contemporary academic cultural heritage study were used to facilitate inspection. One popular technology was augmented reality and with it the ability to convey spatial information such as scale, through comparison of the digital cultural item and real-world environments & items.

Meanwhile, virtual reality technologies were discussed in the context of 'immersive' experience, where the visitor was expected to interact with and within a digital environment. Both AR and VR provide additional interactivity and information to a visitor wishing to inspect a digital cultural item, especially with regards to conveying spatial information such as the relative size of a gorilla's skull compared to the user or digitally placing the user within a cultural heritage environment. As one participant mentioned:

"Why we're interested in immersive as well AR, is that we're going to look at these objects to scale. On a table top I can see how big this gorilla skull really is. We did this the other day with a bear. We searched Google for a bear and we got a kind of a scene in AR. I put it in our living room and I showed it to my partner and they literally got the flight response from it. That's scary, that's dangerous, because it's so big. This thing is in my living room and it's really scary and it's really big. Try doing that on a web-page."

However, these technologies still require systems that are unavailable to the majority of visitors through a combination of cost and the requirement of specialist technical knowledge.

Online platforms present 3D digital cultural items in a form that many visitors can access, assuming they have a personal computer and access to the internet. Of note was the popularity of digital item display sites such as Sketchfab, which provides the functionality for VR viewing. These 3rd-party managed platforms are attractive to institutions perhaps because they allow for the externalisation of resource costs, such as time, technology and training, which would otherwise need to be absorbed by the institution itself if they were to create, manage and develop their own digital item viewer. And with the discussion surrounding accessibility, one of the advantages of a 3rd-party site for sharing digital cultural items is its potential to help encourage efforts to standardize digitization efforts through only supporting selected file formats and file sizes while encouraging best display practice through visibly recording and displaying the popularity of a given digital cultural item or curated collection.

As noted, nearly every participant recounted how spatial information supported the vistor item interaction and, by extension, the learning experience. However, much of the spatial information is lost when a curator relies on platforms like Sketchfab, such as scale and locative information. While many digital cultural items shared through the platform do include a reference to assist users in appreciating scale, the techniques used vary greatly as do their effectiveness. With regards to locative information, this can typically be found in scans of cultural heritage sites, perhaps due to the process of capturing data using drones which automatically, and also typically, includes an area much large than the chosen cultural site. And yet, for most digital cultural items, especially those of a smaller size, locative information is commonly absent, with digital cultural items instead displayed within the 'black or grey void' of digital space.

What can be done to better leverage the digital void, to improve the visitor experience and provide additional learning opportunities? Curation is more than simply sharing and showing. And yet it seems that while CHPs are overcoming the technical challenges of digitizing and sharing cultural items, a few critical facets of curation, such as building and supporting a narrative through object placement and environment design, have received less attention than they deserve. This is understandable if we accept that 3rd-party digital item sharing platforms, while offering convenience, also constrain curation efforts through the selection of tools and systems they provide. How might CHPs gain additional spatial and locative tools to support forming narratives for curated collections? And what form would they take?

6. Conclusion

In this article we have attempted to give a 'voice' through semi-structured interviews to 10 participants including both CHPs and SPs, in an effort to answer how the increasing trend to digitize and the push to engage with rapidly changing technologies effect the everyday experience of the audience involved with the digital cultural items, their capture, management and curation. Overall, CHPs and SPs were positive about the digitization of cultural items with all participants reporting on the value of increased accessibility, specifically their ability to be shared and made available far more readily than their analogue counterparts. Digital cultural items were reported as being used in a variety of ways to provide educational experiences where visitors could inspect and, in some cases, approximate experiences with digital versions of analogue items that would otherwise be impossible. Furthermore, the increased level of interaction has supported new and often exciting ways of teaching and learning for both curator and visitor.

However, the resources required for digitization, specifically the investment of time, the specific skill sets and the specialized technologies required, continue to challenge CHPs. While research efforts continue to advance digitization technologies and practices, CHPs are concerned with managing the digital cultural items they have available while ensuring that their key advantage, accessibility, is not lost as a result of a given technology or practice becoming no longer supported. In essence, CHPs are interested in 'using digital items better' and research that supports their day to day practice through making technologies easier to use, for themselves and visitors, while ensuring their efforts of digitization and curation are supported long-term and in tandem with the continuous advancement of technology.

In the future, a second study will aim to explore the benefits of gathering spatial and locative data when integrated into the presentation of digital cultural items using commonly accessible platforms of interaction, specifically screen-based technologies.

7. Acknowledgements

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