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Visualising Evidence and Landscapes of Atrocities: An Ethical Perspective

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Recently, Holocaust researchers have used forensic archaeology to examine tangible evidence of atrocities; both as material culture and investigative data (Sturdy Colls & Branthwaite 2018; Schute 2017; Haimi & Mazurek 2013). Archaeologists use a wide range of primary sources including maps, photographs, witness testimonies, remotely sensed data, artefacts, vegetation and anthropogenic landscape changes. Since 2000, archaeological investigations of Nazi sites of persecution have increased. As most Holocaust landscapes were not examined post-1945, these investigations are globally significant (Sturdy Colls 2015; Gilead *et al* 2010). Accounting for investigative sensitivities, non-invasive forensic archaeological approaches are increasingly applied to fieldwork, producing digital data, recording material culture and structural remains (Sturdy Colls 2015). These data provide insights into how victims lived, survived, and died, and how perpetrators used the landscapes to enforce dominance and control. In this chapter, we outline a case study from Alderney (The Channel Islands) which uses virtual heritage technologies to present forensic archaeological data. We assessed its impact on (i) UK secondary school students, and (ii) employees and visitors of the United States Holocaust Memorial Museum (USHMM). In doing this, we sought to answer the following: Can virtual heritage environments, coherently and accountably disseminate forensic archaeological Holocaust data? How do users learn about the Holocaust from interacting with virtual heritage environments? What ethical considerations should be considered when constructing virtual Holocaust environments?

Visualising Sites of Atrocities

Holocaust archaeology increasingly generates digital data which requires innovative representation. Its dissemination through virtual heritage technologies conforms to Beech's ideology that Holocaust memorials fulfil both a 'remembering' and 'not forgetting function', naturally commemorating events and landscapes (2002, p. 199). However, representation style and format can influence audience per-

ceptions. Details such as artistic and historical licence, representation type, and presentation of multimedia, all impact what the audience 'takes away' from interactions (London Charter 2009). Creators often perceive photorealistic representation as the 'gold standard' of success (Tan & Rahaman 2009; Roussou & Drettakis 2003). Although photorealistic representations of Holocaust landscapes are possible, many sites only offer fragmented evidence to inform spatial and aesthetic details. Augmented reality provides a suitable approach for on-site representations where limited or no physical structures survive, and this has been used effectively at Bergen-Belsen in Germany (Belsen-project.com 2012) (Figure 1). This project combined 3D reconstruction and augmented reality to visualise features within the landscape destroyed by the British Forces in 1945, to prevent further spread of typhus (USHMM.org 2020) (Chapter 7). This displays the significance of these tools given the Nazis' endeavours to eradicate and conceal their atrocities (Sturdy Colls 2015; Arad 1987).

Virtual tours provide spatial visualisations by geotagging data within contemporary landscapes. The *Accessing Campscapes: Inclusive Strategies for Using European Conflicted Heritage* (iC-ACCESS) initiative, developed 3D visualisations (generated by laser scanning and photogrammetry) displaying Westerbork (the Netherlands), Falstad (Norway), Stara Gradiška (Croatia) and Treblinka (Poland); alongside tagging of historical information in the virtual spaces (iC-ACCESS 2019). This project demonstrated the educational benefits of virtual heritage by encompassing interactive and engagement qualities considered essential for learning (Kozhevnikov *et al* 2014; Waring & Evans 2014).

Figure 1. (Left) Bergen-Belsen augmented reality app (Belsen-Project.com, 2012). (Right) Bergen-Belsen 3D reconstruction (Belsen-Project.com, 2012).

Studio 101% developed a 3D model of Auschwitz-Birkenau for use within criminal proceedings, refuting the defence of former Nazi camp guard Reinhold Hanning that he was unable to see people being

exterminated from his position in a watchtower (BBC.co.uk 2016). Additionally, they developed a virtual reality application of Auschwitz-Birkenau titled *Witness: Auschwitz*, providing audiences with immersive experiences to explore the camp (Alphr.com 2017) (Figure 2). These representations vary significantly, which is often attributed to a project's aims, objectives, and method/equipment selection. For example, the abstract design of the Bergen-Belsen 3D models excludes details such as colour and avatars (Belsen-Project.com 2012). The *Finding Treblinka* platform used panoramic photographs to display how the site appeared in 2013 (Sturdy Colls 2015a). In contrast, the laser scanned Auschwitz 3D model portrays colours and details such as a barbed-wire fences and terrain. The virtual reality simulation of Auschwitz contains both these forms of representation through a video-game style, also incorporating sirens and weather conditions (Figure 2). The Bergen-Belsen, iC-ACCESS and Studio 101% Auschwitz models combine multimedia within their representations which describe specific areas within the camps. These materials aid audience associations between contemporary virtual environments and the past (Ibrahim *et al* 2011). They support the 'real goal' of virtual heritage, to understand past cultures and experiences, alongside enhanced user experiences through 'interactive digital storytelling' (Rizvic 2014, p. 7). These virtual representations highlight the variety of methods used to depict Holocaust scenes and environments. Of the four, only the virtual reality model of Auschwitz (Studio 101%) shows how the camp operated during the Holocaust; contrasting with the laser-scanned Ausch-

witz model and iC-ACCESS platforms which display how the camps appear today; and the Bergen-Belsen model which shows spatial attributes of the camp (independently and within a contemporary landscape).

Figure 2. A photorealistic virtual reality model of Auschwitz Birkenau concentration camp created by Studio 101% (WitnessAuschwitz.com. (2017).

Existing Frameworks

Virtual heritage literature emphasises requirements for user perspectives, but these are commonly underdeveloped (e.g. Champion 2014; Ibrahim *et al* 2011). The justification for end-user input stems from educational and communication interaction experiences, with decisions regarding 'how' and 'what' users experience being controlled by the expert, and thus the 'sense of perception is subjective' as 'content without relating directly to how a viewer perceive the virtual world, does not create any meaning' (Tan & Rahaman 2009, p. 144). Ibrahim and Ali further highlight that 'the viewer constructs the narrative', through the way content is selected and discarded (2018, p. 11). Although these approaches are useful for archaeological representations of the Holocaust and Nazi persecution, further research into user interpretation is required to understand its effectiveness. Specific guidelines for digital representation of Holocaust sites are lacking. However, broad guidance for cultural heritage computer-based representations exists through the London Charter which promotes 'intellectually and technically rigorous' visualisations, and the Seville Charter, which focuses on archaeological heritage computer-based visualisations (Lopez-Menchero & Grande 2011; London Charter 2009, p. 2). These

documents detail the transparency, authenticity, reliability, and accuracy required for constructing and disseminating computer-based representations through 'scholarly rigour' (London Charter 2009, p. 2).

The emphasis within these documents is firmly on the creators' perspective, not the user. More evaluation of public perception of such projects is needed to understand how archaeological representations of Holocaust landscapes can be effectively disseminated.

Case Study: Sylt Camp

Since 2010, the Centre of Archaeology at Staffordshire University has undertaken forensic archaeological investigations at Sylt concentration and labour camp (Alderney, The Channel Islands) as part of the *Alderney Archaeology and Heritage Project* (Sturdy Colls *et al* 2020). Sylt provides a unique case study, being the only concentration camp constructed on occupied British territory during World War Two (Megargee & White 2018). The camp is currently concealed by vegetation, the only obvious physical reminders of its history are the gateposts leading to the prisoners' compound, several concrete bunkers and a tunnel between the prisoners' bathhouse and Commandant's villa; and a small commemorative plaque (displayed on the gateposts) (Figure 3). This archaeological fieldwork has been central to interpreting Sylt's landscape through mapping surviving structures, identifying alterations, and ascertaining camp boundaries. Data obtained provided the materials for dissemination through virtual heritage technologies. Following the Second World War, Sylt became public knowledge through media reports, resulting in rumours about the existence of gas chambers on Alderney (Megargee & White 2018). Quashing these claims, the findings from Pantcheff's 1945 investigation were publicised, presenting a less atrocious version of events (*ibid.*). The publication only dedicated 11 pages to Sylt's history, 'downplays' the atrocities and extent of prisoner brutalities, and dismisses significant findings from Pantcheff's own earlier investigations, specifically, the diversity of prisoner nationalities (Carr & Sturdy Colls 2016; Pantcheff 1981; WO311/13). With a lack of clarity between the historical record and 'official' narrative, much sensationalist literature has emerged, such as Steckoll (1982), alongside contemporary press articles on BBC.co.uk (2017) and Dailymail.co.uk (2017). Collectively, the management and exhibition of former Nazi sites within the Channel Islands (specifically Jersey, Guernsey and

Alderney), draw upon selective memories to 'promote' their version of Nazi occupation; consequently, detaching memory of the victims killed in the islands (Carr 2014; Lennon & Foley 2000).

Figure 3. Images of Sylt camp (Kerti, 2017). (Top left) the overgrown extent of Sylt. (Top right) Entrance to the Commandant's tunnel. (Bottom left) Sylt's gatepost entrance to the prisoner compound. (Bottom right) memorial plaque located on Sylt's gateposts.

Explore Lager Sylt

As part of the author's PhD research, researchers evaluated if virtual heritage technologies provide a method to disseminate materials from sites of Nazi persecution and genocide which: (1) bear limited resemblance to their former appearance; (2) lack obvious surviving landscape evidence; and (3) where on-site commemorations are not desired. The platform *Explore Lager Sylt* used two types of virtual representations, comprising a 360° panoramic photo virtual tour (Figure 4) and a series of evidence-based 3D reconstructions. The virtual tour displays nine-scenes within the former camp area as they

appeared in 2015. As many camp structures were destroyed in 1945, essential landscape features were absent from the virtual tour. Hence, a series of four 3D reconstructions display the positioning of structures constructed at Sylt between 1942-1944, superimposed over aerial images of the corresponding year. These models illustrate expansion of the camp and a change in command from the Organisation Todt (OT) and Schutzstaffel (SS) in 1943 (Sturdy Colls *et al* 2020).

The platform presents diverse content, from both DBA research (including archives and eyewitness testimony) and archaeological fieldwork (including photographs and non-intrusive survey data). The DBA sources form narratives about Sylt from alternative perspectives including victims, observers, perpetrators and (post-liberation) investigators. Narratives were also created from the archaeological evidence, with video voiceovers explaining its significance. Within the platform, users can view an introductory video, which outlines the island's Second World War history including evacuation and occupation in 1940. An 'About' tab provides a project overview whilst the 'Infographic' tab outlines the non-invasive methods used by forensic archaeologists during investigations. The 'Timeline' tab displays the camp's gradual construction through text and aerial reconnaissance photographs. The virtual tour links digital material through geotagged points, conveying the spatial context of each area within the camp through a non-linear narrative. The 3D reconstructions are presented alongside varied multimedia, providing explanations regarding the camp's construction and layout. These materials are presented through a chronological narrative.

The platform provides remote (virtual) access for audiences to explore Sylt's history if a physical site-visit is impossible. Currently, Sylt has no heritage management framework, and the surviving landscape features are concealed by extensive vegetation growth, with no information boards explaining the relevance of each location. Therefore, the platform provides more information in comparison to the physical site, as audiences can view key landscape features through videos and photographs, taken during fieldwork vegetation clearance. Additionally, a narrative of Sylt is presented through diverse multimedia, providing an insight into prisoner and perpetrator daily life, by connecting historical sources and testimony to the landscape and surviving structural features. This performs both an educational and

commemorative function, addressing issues surrounding the lack of heritage and unsatisfactory site commemoration.

Figure 4. Scene one of the 360° panoramic photo virtual tour from the 'Explore Lager Sylt' platform showing a geotagged point, toolbar, and navigation (aerial image) (Kerti 2019).

Qualitative Studies

Qualitative research methods were deployed to acquire student, expert and public perspectives sur-

rounding the case study platform: (1) Focus groups were conducted at three different UK secondary schools, (2) Interviews were conducted with different employees at the United States Holocaust Memorial Museum (USHMM), and (3) Questionnaire surveying was conducted with visitors of the USHMM.

Focus Groups

Focus groups were conducted at three UK secondary schools, each with a different religious denomination (Judaism, Christianity, and secular) to understand if different religious values influenced student perspectives. Table 1.1 outlines the demographics of the 32 participants. Religious perceptions were considered paramount to interpret given the complexities and lack of universal definition regarding the term 'Holocaust' (Foster *et al* 2016; Carrier *et al* 2015). This was important to acknowledge as the Holocaust is primarily considered a Jewish event and Sylt camp was not documented to have housed Jewish prisoners (WO311/13).

Religion	Gender		Age		Ethnicity				Education
	Male	Female	11-14	15-20	WE	WJ	BF	WB	S/H.E
Christian	5	4		9	7		1	1	10
Judaism	7	6	13		11	2			13
Secular	6	4		10	10				10

Table 1.1: Composition of focus group participants. Key: W-E = White English; W-J= White Jewish; B-F = Black African; W-B = (Mixed) White + Black Caribbean; S/H.E = Secondary/Highschool Education

Interviews

Interviews were conducted with a range of USHMM employees including documentation specialists, researchers, historians, exhibition developers, and educational outreach professionals. The varied participant expertise provided rich insights regarding Holocaust representation (Braun & Clarke 2006). Table 1.2 outlines the demographics of the 16 participants.

Religion	Gender		Age								Education			Race/Ethnicity		
	Male	Female	26 - 30	31 - 35	36 - 40	46 - 50	51 - 55	56 - 60	61 - 65	NA	U.G	P.G	NA	White	Chinese	NA
Judaism	3	2	1		1	1			1	1	3	2		5		
Mainline Protestant		1				1						1		1		
Secular	3	4		1	2	1	1	2			2	5		7		
Orthodox Christian	1		1									1			1	
N/A	2								1	1		1	1			2

Table 1.2: Composition of interview participants. Key: NA = Not Answered; U.G = Undergraduate; P.G = Postgraduate.

Questionnaire Surveying

Questionnaire surveying was conducted amongst USHMM visitors. As participants were visiting the museum, they were considered to have a personal interest in Holocaust history. Therefore, these participants provided an ideal sample of individuals who may view the *Explore Lager Sylt* platform. Table 1.3 outlines the demographics of the 28 participants.

Religion	Gender			Age											Education				Race/Ethnicity		
	Male	Female	N/A	15-20	21-25	26-30	36-40	41-45	46-50	51-55	56-60	61-65	NA	NQ	H.S	U.G	P.G	NA	White	Other Race	N/A
Judaism	1	2		1	1			1							1	1	1		3		
Mainline Protestant		1				1											1		1		
Secular	4	3			1	3	1		1		1				2	5			6	1	
Orthodox Christian		1		1											1				1		
Evangelical Protestant	2	2				1				1	1	1			2	2			4		
Catholic	2	6		6		1						1		1	5	1	1		8		
Judaism/ Secular	1										1						1		1		
Denominational Christian	1											1					1		1		
N/A			2			1							1			1		1	1		1

Table 1.3: Composition of questionnaire participants. Key: NA=Not Answered; NQ = No qualifications; H.S = High School; U.G = Undergraduate; P.G = Postgraduate.

The participant sampling also contemplates that Holocaust perspectives may differ between countries. As the focus groups comprised UK school participants, it was considered that responses may reflect those formed from British Holocaust narrative perspectives. Therefore, the interview and questionnaire survey participants primarily from the United States of America (US), provided a comparison between International Holocaust narrative perspectives; whilst also raising awareness of Sylt camp globally.

Results and Discussion

The case study site presented many representation challenges due to the site's current appearance, fragmented testimony, and the conflicting narratives about Sylt's history. Therefore, to understand the moral underpinnings of Holocaust representations, this research sought to learn what participants believed, disbelieved, and considered as evidence. Four key themes were identified from data analysis: accountability, communication, education, and presentation.

Accountability

Within the physical realm, archaeology's role in Holocaust investigations is to identify and record sites, structures, and landscape features to provide evidence of atrocities (Sturdy Colls 2015; 2014; Haglund *et al* 2001). This study highlighted that in the digital realm, participants considered that archaeology continued this role. Overall, 41% of participants considered that archaeology provided physical evidence of Sylt camp (*n*=31) which is demonstrated by frequent use of the words 'believable' and 'evidence' when describing the archaeological data. As a secondary school participant explained:

> because obviously the site was destroyed…if you just went and took these pictures and said this was here, you'd think well how do I know that?...without that archaeological side where your (sic) showing things have been uncovered, the greenery has changed because of this, I think that adds credence to it.

Braun asserts that 'evidence and proof is used to establish the "truth" of historical representation' (1994, p. 172). Therefore, a requirement to understand what constitutes 'evidence' from different participant perspectives was important, as archaeology can reveal new insights about past events (Sturdy Colls 2015; González-Ruibal, *et al* 2008). Participants considered that archaeology provided information that would be otherwise unknown and the ability to understand historical events was enhanced alongside the credibility of the information. Secondary school participants emphasised that data visualisation 'helps' make the findings more 'believable' and 'understandable'. This demonstrates that archaeology presented an evidence-based Holocaust narrative. Although, nine participants (USHMM employees) believed that archaeology provided 'evidence' of Sylt's narrative, they still maintained greater belief for the popular narrative. This highlighted that despite archaeology's ability to reveal new insights about the Holocaust, established narratives can still take precedence over 'evidence' (Van der Laarse 2015).

An uncomfortable truth within Holocaust history is the reliability of historical testimony and documentation. As Shneer (2015) explains, Nazi documentation was often misleading, through purposeful deceit, biased writing, or absent information. Historian Hilberg describes 'flawed samples' within testimonies, as victims, perpetrators and bystanders encompass their own perspectives and personal 'attitudes and reactions' (1985, p. 236). Similarly, the concept of reliability also extends to archaeological findings, which can be considered ambiguous, as evidence can encompass 'many truths' (Sturdy

Colls & Branthwaite 2018, p. 442). To combat these issues, conflicting accounts were displayed together, highlighting alternative perspectives of the same event. This approach to Holocaust dissemination is used by USHMM, as one employee explained, if the evidence is unknown and/or conflicting, it is addressed within the literature, publications, and exhibitions. This research identified that participants do not require a 'definitive' answer when presented with evidence, providing that transparency of information is maintained. The availability of sources restricted the development of the platform, specifically the lack of extensive victim testimony and photographs. Consequently, authenticity of victim experiences was not achieved in a similar manner to the authenticity of computer-based representations. Fragmented and conflicted testimonies created issues maintaining an incontestable narrative. In contrast, representing physical structures against historical documentation provided indisputable evidence of the camp's spatial narrative. However, Hilberg (1985) highlights that the Holocaust is constructed from different perspectives. Thus, to maintain the narrative's authenticity, the narration of the Sylt platform required victim, perpetrator, bystander, and investigator testimonies. This was valued by participants, as a USHMM employee explained, 'you have former SS officers describing…the camp and describing their experiences and you had the survivors describing this as well…all of that was a useful complement to the spatial representation'.

Education & Communication

Overall, 47 participants agreed that archaeology was a good way to learn about a site of Nazi persecution/genocide, using words such as 'interesting', 'good', 'understand', 'evidence' to describe their reasonings. As a USHMM employee stated, 'I think you don't understand what a place is like unless you get a sense of… what the building materials were like, why people made the decisions they did… the only way you can get that is through archaeology'. Other comments explained that archaeology provided physical evidence of historical events by verifying surviving landscape features. This information was considered valuable for educational purposes through spatial and 3D visualisation of information. A minority (*n=3*) considered that archaeology was not a good way to learn about a Holocaust site. A secondary school participant stated, 'to know about the concentration camp, it's not the archaeological side of it, more like what they went through…not really how it was made out'. An USHMM employee explained 'as a historian, I feel that ultimately I would learn more from testimonies and documents in which people, you know whatever the foibles of memory... described what they had gone through'. This highlights that a balance between archaeology and historical documentation should be carefully contemplated when developing computer-based representations for sites of conflict and genocide.

Participants frequently used the words 'interactive' and 'engaging' when describing the platform, outlining certain benefits of presenting information through virtual heritage technologies (Rizvic *et al* 2013; Roussou 2007). Participants used these terms to describe the virtual tour, 3D reconstructions, photographs, videos, and testimonies. Interactivity was initially formed through the virtual environment but maintained through narrative, multimedia materials, navigation, empathy, and authenticity. Both the virtual tour and 3D reconstruction were described as interactive and engaging, challenging the notion that photorealistic representations are the 'gold standard' of success (Tan & Rahaman 2009; Roussou & Drettakis 2003). Although authenticity performed a valuable role in producing interactivity, engagement, and immersion with the virtual heritage visualisations were not limited by abstract representations (Roussou 2007; Affleck & Thomas 2005). Maintaining these qualities required attention towards narrative and empathy, suggesting that immersion is also created through emotional engagement. These characteristics have educational significance, as individuals acquire information through 'problem-solving', 'critical thinking' and 'learning by doing' (Tost & Champion 2007; Roussou 2002, p. 5). As an USHMM employee explained, 'I felt much more encouraged to learn the information here'.

When asked, 'did you get a sense of being there?' Outside of the expected responses (360° panoramic photo virtual tour and multimedia), eyewitness testimonies also enhanced interaction and engagement by creating immersion through empathy. Roussou describes immersion as 'the illusion of being in the projected world, being surrounded by the image and sound in a way, which makes you believe that you are really there' (2002, p. 94). As an USHMM employee explained, 'I was in the…material trying to see what…can I read about here and I certainly had a sense of losing space and time'. This highlights that not all Holocaust source materials require extensive production, with original testimonies performing a valuable role. Empathy is considered to evoke cognitive (knowing) and affective (caring) qualities within storytelling, which is essential in Holocaust education (Garcia & Rossiter 2010). As Zillmann explains, 'empathic engagement is what fuels interest in tales...the empathy concept can thus be considered pivotal to any interest in, and likely gratification from, storytelling via the media of communication' (2006, p. 152). Similarly, Hand and Varan's research on interactive narratives, suggests that 'empathy becomes the link between interactivity and structure', as-long-as audiences have no ability to alter the overall narrative (2009, p. 12).

Explore Lager Sylt demonstrated empathic qualities derived from engagement with multimedia. Participants (*n*=18) indicated that photographs provided a useful form of empathic communication.

> The photographs of invading German forces and the people give a more personal side to it to show that people actually affected by the events…it felt more real because instead of it just being written information to see the actual impact of it was quite effective.
>
> (school participant)

Both testimonies and archive sources were widely discussed as evoking empathy and emotional understanding. This was demonstrated by a school participant, 'for me, it's the authentic parts…the first-hand accounts…when you read the bits that go with it, that hits home a little bit more'. Another student described listening to survivor audio accounts and the empathetic qualities conveyed by presenting real testimony; 'the thing which made it so believable was the fact that it made you think what he was actually witnessing … the fact of how much distress it actually caused in the voice' (y school participant). Video representations were considered the most effective and preferred multimedia method of communication (*n*=44). By viewing survivor subtitled videos, participants considered that empathy was conveyed through the pitch and tone of the survivor's voice. Secondary school participants commented, 'the videos were good, it was very easy to listen too...I preferred that more than reading.' These perspectives mirror e-learning and multimedia preferences (Ljubojevic *et al* 2014; Steffes & Duverger 2012). Besides increasing positivity and motivation amongst students, video encompasses qualities that assist engagement (*ibid*.). Hsin and Cigas examined six online introductory courses (between 2005 and 2012) highlighting that video 'had a noticeable effect on improving student retention' (2013, p. 258). Videos within the online courses did not directly increase grades, however, more students passed the courses (*ibid*.).

On reflection, the requirement to manufacture empathy when constructing *Explore Lager Sylt* was underestimated. This was attributed to believing that 'evidence speaks for itself', with archive documentation, testimony, and audio accounts authentically conveying events. Although the platform generated emotional interactions through testimony, responses highlighted that empathy, testimony and (subsequently) narrative require attention. For example, a USHMM employee stated, 'I don't really get a sense of … the depth of survivor narratives' and another explained 'normally, it seems like people have a better response to personal stories ... than just the raw data'. This supports virtual heritage's

perspective that empathy is a product of narrative and storytelling (Champion, 2016; Pujol *et al* 2012). Whilst these empathic qualities assist in creating an emotional engagement with a narrative, we argue that they differ from being able to put yourself in another person's shoes. As Gubkin (2015) recognised, students trying to form associations with a Holocaust victim's experiences was moot, given their differences in personal experiences.

Within physical and digital realms, a principle complexity of non-linear narratives concerns spatial-temporal sequencing, through undefined narrative configurations (Meyer 2016; Azaryahu & Foote 2008). Linear based narratives are often structured with a beginning and end. This contrasts non-linear narratives, which have no determined start and finish, but a narrative formed through content interaction. Therefore, audience narrative interactivity can be considered unpredictable, as Rizvic *et al*, outline, 'our experience from previous virtual museum projects showed that visitors often do not explore all displayed objects, but only a small subset' (2013, p. 258). Due to the complexities regarding starting and finishing points, not all content should be presented within the virtual environment itself (such as a tour), as not all content is guaranteed to be viewed (*ibid*.). This research highlighted that archaeological materials can be presented through linear and non-linear formats, with requirements dependent on specific factors. The 3D reconstructions were more suited to a linear format. However, the non-linear virtual tour was considered effective for displaying Holocaust materials without suggesting priority between different evidence and sources (Sturdy Colls 2015). A school participant explained, 'you got photographs, accounts, audio, you got some video, rather than just sitting reading text about one thing, this is very informative on a number of different levels'. This layering of multimedia addressed complexities encountered when representing Sylt's narrative, such as fragmented testimony, which would have been apparent if presented in a linear narrative. Using a thematic spatial narrative (the virtual tour) provided the opportunity to amalgamate alternative perspectives, regardless of chronological order. Therefore, a spatial narrative can effectively disseminate archaeological investigative materials relating to sites of atrocity, when limited or incomplete details about them exist.

Meyers states that digital storytellers 'create a narrative corridor…[and] we may have to embrace the idea that we no longer write ONE story but design a narrative corridor for potential stories' (2016, p. 10). If unconsidered, these intermittent interactions have the potential to obscure meaning, through

a loss of context within a virtual environment. This was evident within the Sylt data through two aspects. For example, several participants queried the platform's intentions, as one USHMM employee considered the platform was 'organised to teach about, specifically the application of forensic archaeology', whereas, a secondary school participant, stated 'it was quite interesting, to learn about something from a website that was specifically for one particular site … normally you don't get that kind of information unless you go to like a place'.

Presentation

This research endeavoured to understand if computer-based representations could replace visiting a site of Nazi persecution and genocide. Nine participants considered that the *Explore Lager Sylt* platform could replace a site visit if they were unable to visit. Another nine participants explained that the platform would replace a site visit, due to Sylt's current condition, explaining that greater information about the site can be acquired from the digital representations, as no information boards or visitor centre currently exists. Two participants stated that the platform would not replace visiting the site but would provide a useful resource in preparation of a visit. Two participants believed the platform could not replace a site visit, as greater empathy is generated from visiting the site. These participants considered that senses, such as touch, are only achieved through a physical visit. Four participants believed that after viewing the platform, they were more encouraged to visit the site. The platform was considered a 'good' starting point to learn about Sylt's history, which could then be enhanced through a visit. Overall, nine participants agreed that the platform would replace a site visit, however, 14 participants believed that a site visit could never be replaced.

The aesthetics of persecution site representations can significantly influence the user's impressions of the credibility of content (Goulding 2015). Thus, design during the platform's development was contemplated to ensure information was presented suitably. The London Charter describes preserving the 'intellectual integrity' of sources through contemplating aesthetic, design and presentation factors when constructing computer-based representations (London Charter 2009, p. 7). Within the platform, yellow was primarily used within the infographic which outlined forensic archaeology and its methodologies alongside the timeline displaying the construction of Sylt camp (Figure 5). This colour belongs to the 'warm end of the spectrum', alongside colours such as orange and red (McNeill 1972). Yellow was selected due to its improved reading performance for certain Special Education Needs (SEN), for example dyslexia (Rello & Bigham 2017).

Data analysis highlighted that a small number of participants considered the colour yellow used within the Holocaust representations as inappropriate. As one USHMM employee explained, 'yellow is just too sunny…it's a serious topic and the yellow makes it less serious'. Within the Holocaust, yellow is typically associated with the Star of David Jews were forced to wear throughout Nazi-occupied Europe. No participants described yellow as inappropriate due to connotations with the Star of David, although this may be attributed to Sylt not housing Jewish victims (Sturdy Colls et al 2020).

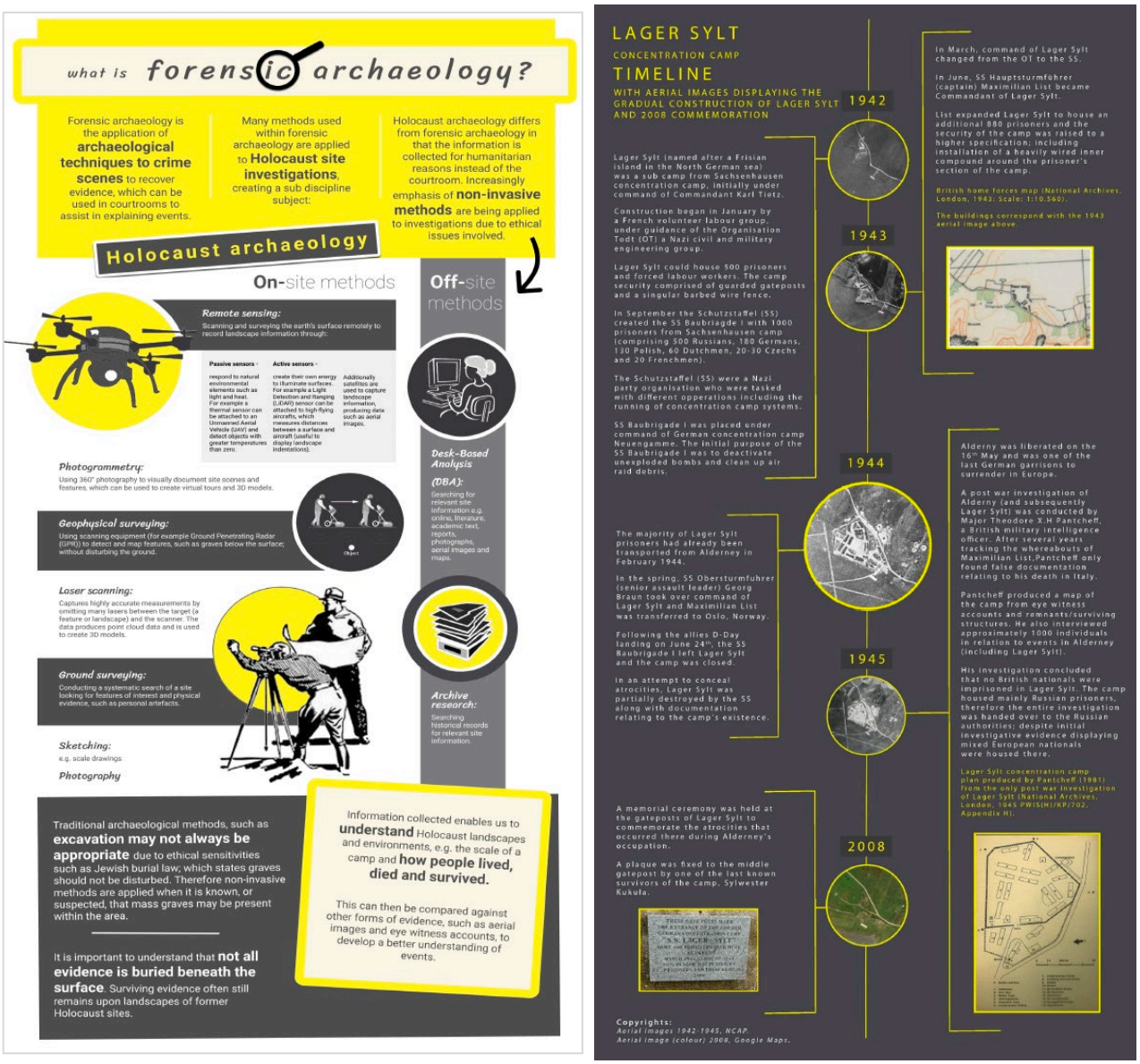
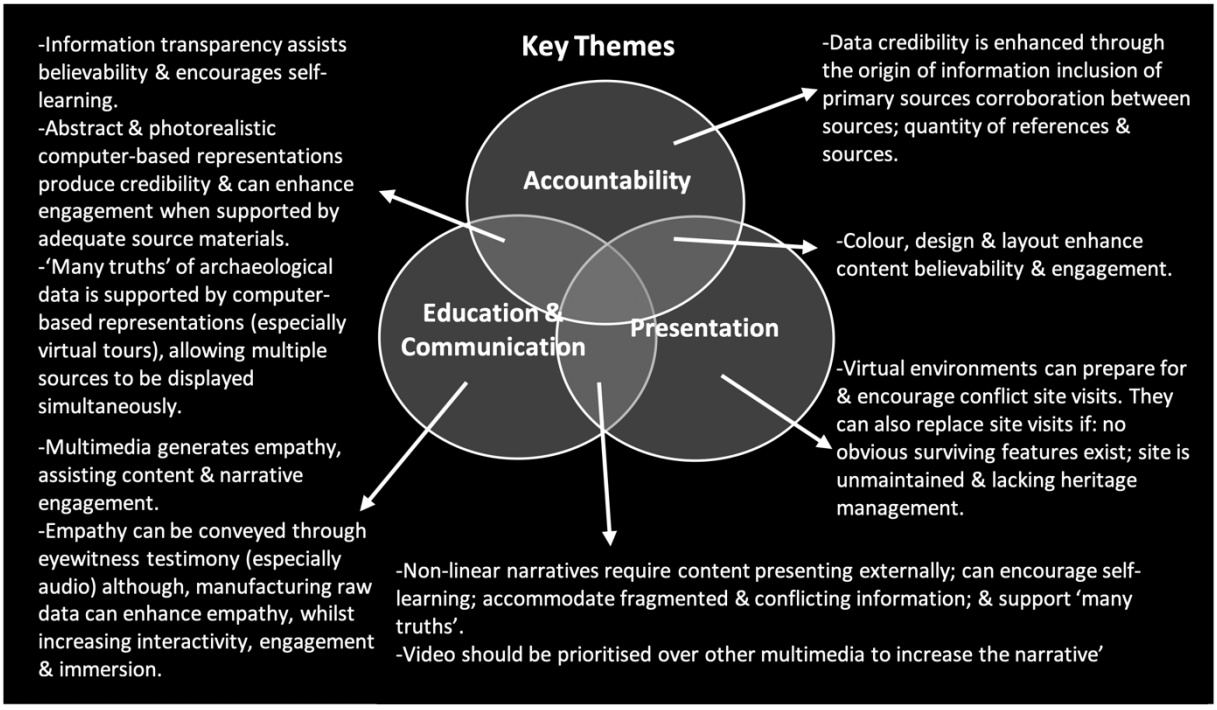


Figure 5. The infographic (left) and timeline for the 'Explore Lager Sylt' platform (Kerti 2019a)

Scarce research exists surrounding the use of colours within Holocaust representations. However, research from psychology (Cyr *et al* 2010), design (Wang *et al* 2010), and advertising and marketing (Lichtle 2007, p. 91), claim that 'colours are known to possess emotional and psychological properties', which are often related to culture and gender (Singh 2006). Research from these fields frequently concludes that cooler spectrum colours are viewed more favourably than colours from the warmer spectrum (Marcus & Gould 2000; Goldberg & Kotval 1999). Research has highlighted design characteristics such as colour, encouraged greater trust and positive perceptions of the information being viewed (Simon 2001). This research highlighted the importance of considering the design and layout of online Holocaust representations. Participants considered a well-organised and well-presented platform assisted content believability, especially amongst younger audiences. Research conducted by Goulding into Holocaust education and denial, using online sources stated, 'individuals generally do not engage



in rigorous or time-consuming information evaluation processes but, instead rely on superficial factors such as the website design and navigability to determine the quality and credibility of the content' (2015, p. 90).

Figure 6. A summary of the key research findings organised into key themes.

Conclusion

To conclude, we offer recommendations for representing forensic archaeologically-derived Holocaust data. This research demonstrated the educational and commemorative effectiveness of using virtual heritage technologies to disseminate forensic archaeologically-derived Holocaust data. Initially, the

construction of the *Explore Lager Sylt* platform was underpinned by the London (2009) and Seville (2011) Charters. However, both Charters focus on computer-based representations from the creators' perspective, not the users. We suggest seven recommendations for the ethical and effective dissemination of archaeological data through virtual heritage technologies. These recommendations specifically cater to sites of Nazi persecution and genocide, which may have limited surviving features, are overgrown, or where heritage is undesired. In doing so, these recommendations are not intended to replace the London (2009) or Seville (2011) Charter principles, but elaborate their core aims.

1. **Computer-Based Representations**: The type of computer-based representation will necessarily be dictated by the project aims and the availability of archaeological and historical data. This can directly influence what is achievable through representation possibilities. Multiple representation types may be required to effectively convey persecution and genocide narratives. Production quality should not be prioritised over authenticity, as both photorealism and abstract representations produce believable and engaging characteristics. All representations require underpinning by contemporary and primary evidence and sources to generate greater belief and understanding.

2. **Aesthetics**: The design and layout of a virtual environment should be considered carefully, as decisions about the reliability and credibility of content are initially formed through aesthetics. Interdisciplinary partnerships between archaeologists and designers may be required. Additionally, colours from the cool end of the spectrum may be favoured over warmer spectrum colours.

3. **Sources & Evidence**: Wherever possible historical and contemporary evidence should be presented in tandem and adequately referenced. Sources should be clearly labelled to avoid confusion between those directly linked to a Holocaust site and those presented as an illustration only. Sources should be contemplated for their sensitivity, especially in relation to living memory and subject consent, which should form a key consideration when deciding which materials to exhibit.

4. **Multimedia Materials**: Virtual environments should incorporate a diverse range of digital materials, catering to different pedagogy needs. If this option is unavailable, then video is considered the most desired form of communication.

5. **Empathy**: This quality primarily derives from victim eyewitness testimonies and can be enhanced through several considerations. Although multiple 'character' narratives can produce empathy, a sin-

gle ‘character’ narrative displaying testimony and photographs of a victim before and during the Holocaust, produce greater empathic associations. Empathy can be further increased through ‘manufacturing’ testimonies, for example, with voiceovers, music and natural sounds. When comparing actor and survivor audio accounts, the survivor audio provides evidence-based (or authentic) empathy.

6. **Content**: Any unknown or conflicting information should be made apparent to users, as this can enhance engagement and believability. Historical documents should be checked, ensuring any cultural references, or words with alternative meanings are explained. An outline of the victim classifications interned within a particular space should also be presented.

7. **Narrative**: Before development, the narrative format should be decided. Linear narratives should avoid long sections of information, which should be organised and presented thematically. Non-linear narratives are useful to present fragmented, incomplete, or conflicting information, due to chronological ordering having no relevance. However, non-linear narratives require external presentation of information to clarify the narrative as not all material is guaranteed to be viewed. A content checklist and/or a database of materials should be presented within a virtual environment, ensuring users can view all content.

In conclusion, we assert that virtual heritage computer-based representations provide a powerful resource to disseminate sensitive data depicting sites of Nazi persecution and genocide. This study revealed that from the creator’s perspective, virtual heritage representations provide flexibility to accommodate fragmented and frequently conflicting information, associated with these inhuman periods of history. Given the nature of atrocities and the perpetrators’ desire to conceal evidence of crimes, virtual heritage visualisations not only provide the ability to recreate historical events and spaces which no longer exist, but also offer essential educational resources to help ensure these atrocities do not reoccur.

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