

Developing the Bernburg 3D Model for the Digital Transformation of Euthanasia Education.

XML

1. Introduction

During the period of Nazi persecution, one of six Nazi "euthanasia" killing facilities was located on the site of today's Bernburg Psychiatric Hospital. In the summer of 1940, workmen built a gas chamber, two dissection tables, and a crematorium with two incineration ovens in the basement of the former Männerhaus II. On 21 November 1940, the first transport of 24 men from the Brandenburg Neuruppin state hospital reached the Bernburg killing centre. They were followed by over 9,300 men, women, and children from nursing homes and psychiatric clinics who were murdered as part of the "euthanasia" programme by August 1941. In the course of 1942, the "euthanasia" was followed by the so-called special treatment 14f13¹. In the late summer of 1943, the Bernburg "euthanasia" centre was dissolved and the buildings returned to the psychiatric hospital. Despite dismantling and the renewed use of the building to care for patients, structural traces of the former killing centre remained, including the gas chamber.

In 2006 the Memorial to the Victims of Nazi Euthanasia Bernburg opened its permanent exhibition² in the rooms of the former killing site focussing on forced sterilisation, "euthanasia" and the murder of prisoners from concentration camps, also informing its visitors about the difficult history of "euthanasia" before the Nazi period. The memorial offers a comprehensive educational program for young people from various types of schools as well as training courses for professionals from medical and social fields. This educational work aims to build a bridge between the past and the present and to keep the memory of the victims of Nazi "euthanasia" alive.

The digital transformation of the memorial site through the Horizon Europe project MEMORISE³ makes it possible to tell the story of Euthanasia in Bernburg in a modern way, suitable to engage a growing digital native generation. It is therefore indispensable for preserving the historical space and a remembrance culture that enables low-barrier access for new groups of visitors across local and regional borders. The development of a 3D model of the memorial site was the first step towards a digital transition, not only for virtual accessibility but also as a basis for developing new, digitally supported educational concepts.

2. 3D Modeling of Memorial Sites

Digitised 3D models have shown to be valuable for conveying and preserving cultural heritage and they have also proven to be useful tools for educating school classes, tourists, and those interested in the topic (Di Stefano et al., 2021). The Theresienstadt Memorial (Terezín Memorial, 2017) uses a 3D model to depict the history of Nazi persecution and provides a digitized representation of the ghetto's surroundings. Similarly, the Anne Frank House (The Secret Annex, 2018) is an important repository that preserves the cultural legacy of Nazi persecution, showcasing an online 3D model that blends historical information with a 3D representation. The NS-Dokumentationszentrum Köln (museen.koeln, 2020) contributes to the understanding of the Nazi legacy through a 3D model that offers a virtual tour enhanced with explanatory audio clips in multiple languages.

Despite the commendable features of the above-mentioned models, our vision for the Bernburg 3D model required specific components that are not implemented in these related works. Firstly, we aimed to include physical objects into the model that were present in 1941-1943 but have been removed, such as a dissection table, incinerators, and a bus arrival hall on the backside of the contemporary building. Secondly, we aimed to embed the 3D model in an interactive interface in order to allow users to overlay the model with different narratives drawn from different sources. Thirdly, we chose to develop the 3D model to be flexibly integrated in and used for a diversity of educational purposes. Finally, a major goal of the project was creating a low-cost workflow, reproducible by related memorials, that requires limited technical know-how.

3. The development of the Bernburg 3D model

The creation of the 3D model can be subdivided into three stages:

Stage 1: LiDAR scanning. In order to develop a cost-effective, reproducible workflow and to gain a user-friendly solution, we decided to use LiDAR (Wang, 2013) for scanning the Bernburg memorial site. LiDAR is a technology that uses light to measure distances and it generates a 3D map of the scanned surroundings. By sending light pulses and measuring the time it takes for the light beams to reflect, a detailed digital 3D model can be made. A low-cost way for LiDAR scanning is to use a free application such as Poly-cam⁴ and a device with a LiDAR camera such as an iPad or an iPhone. We scanned the entire Bernburg memorial in a two-day workshop (Figures 1 and 2).



Figure 1. Scanning the rooms in the Bernburg memorial was a time-consuming task that demanded Camilla (left) and Mark (right) to stay focused.

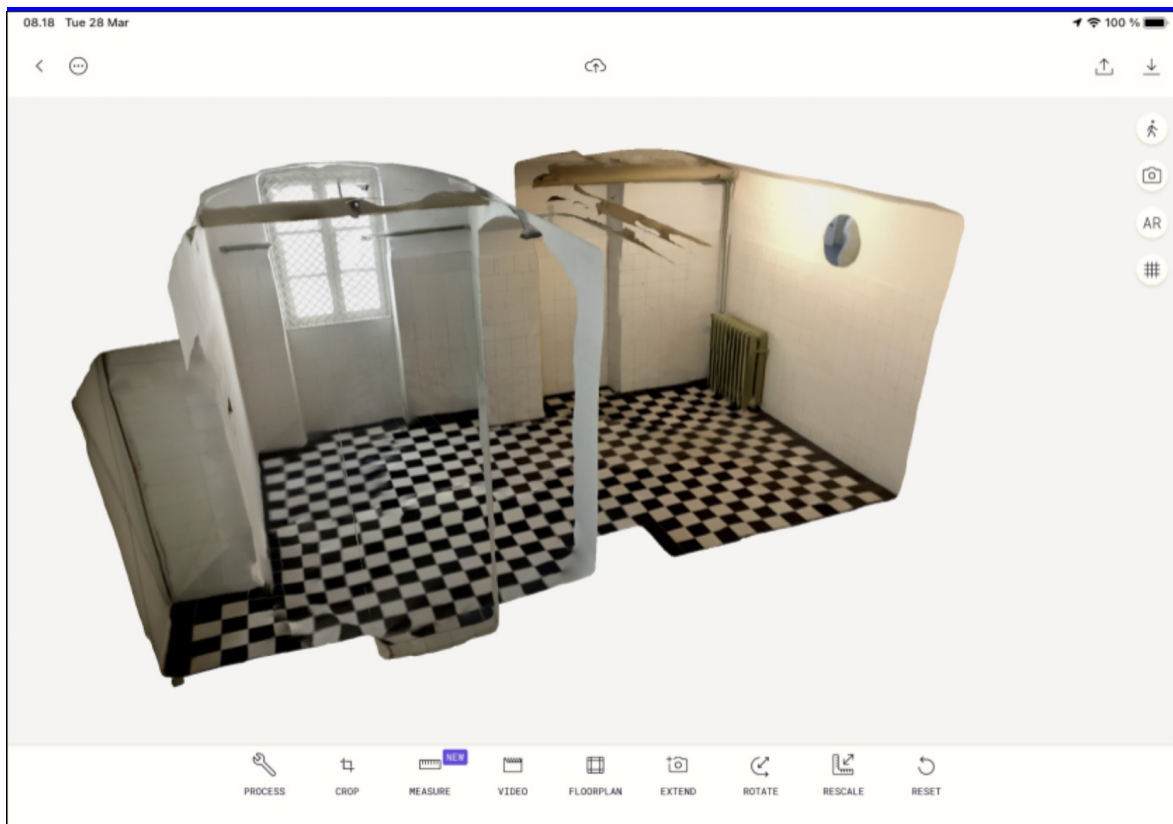


Figure 2. Raw LiDAR scan of the gas chamber.

Stage 2: 3D modelling. We made use of floor plans and high-resolution photographs of the space to develop a comprehensive 3D model. Using the CAD program SketchUp ⁵, we combined LiDAR scans ⁶, photographs, and CAD models created based on floor plans to improve the accuracy and completeness of the digital representation of the Bernburg memorial site. On the one hand, the photographs used for CAD modeling provided a more polished look where needed, for instance where there was a significant amount of text in the physical space of the exhibition. On the other hand, LiDAR scans give an authentic feel to the historical part of the virtual tour.

Stage 3: Interaction and Storytelling. The completed model ⁷ is available on Sketchfab ⁸, an online platform that allows users to share, explore, and embed 3D content. In addition, Sketchfab allows adding annotations to 3D models to support storytelling. We used this capacity to create a virtual guided tour of the Bernburg 3D model. Sketchfab also offers an API that allows embedding and interacting with 3D models on websites. This allowed us to embed the model into the MEMORISE project website ⁹, where we incorporated additional interactive features, which include an audio narration for accessibility purposes. In addition, users can browse statements by the perpetrators that were recorded in the course of public prosecutors' investigations in the 1960s and bear witness to the euthanasia crimes. When selecting a particular location (e.g., dissection room or gas chamber) and an occupation (e.g., nurse,

guard, 3D burner), users can read through statements made by former staff members about the facility. A screenshot is shown in Figure 3.

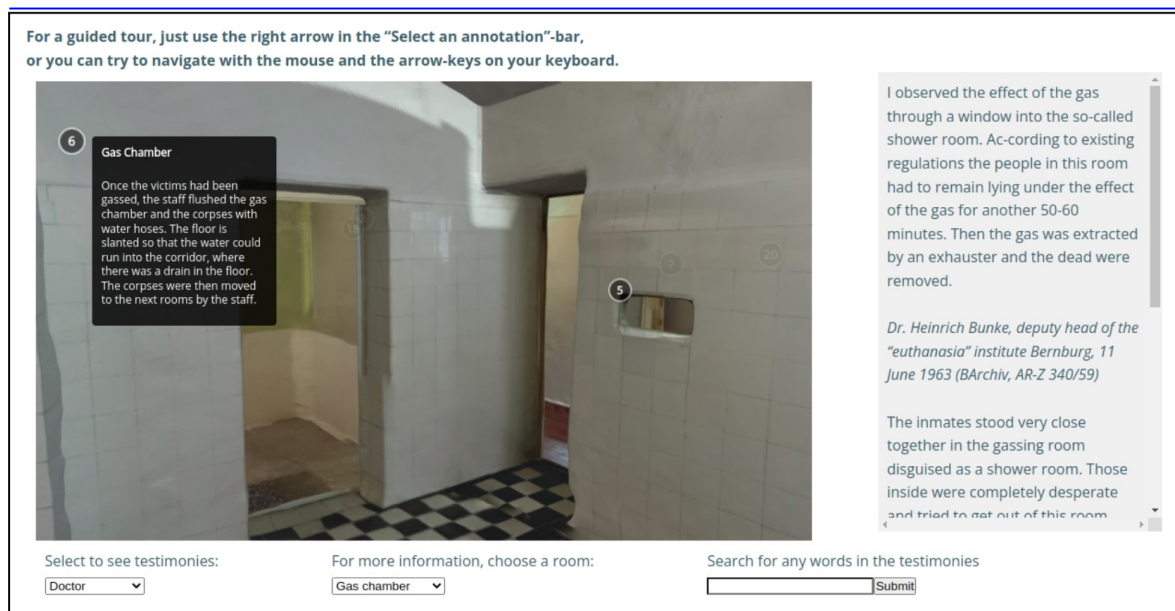


Figure 3. Annotated gas chamber model, embedded in the MEMORISE homepage. Choosing staff type (e.g., "Doctor") and a location (e.g., "Gas chamber") navigates the model to a particular room and excerpts from perpetrator testimonies are shown.

4. The educational potential of Bernburg 3D model

By presenting historical documentation, testimonies, visual materials, and the architectural remains, Bernburg seeks to educate visitors about the history of and ideology behind the practice of euthanasia (Stiftung Gedenkstätten Sachsen-Anhalt 2020).

However, the development of virtualization by memorial sites like Bernburg necessitates redefining how they achieve their educational goals. 3D modelling has the ability to define new spaces of interactions between the users, the historical space and historical sources. In this particular case a great potential can be found in the use of testimonies. Those statements made by individual perpetrators can be used to transmit the history of euthanasia in a multiperspective way. The testimonies precisely highlight the use of the different rooms of the site and the role of different perpetrators. Embedded in the 3D model and contrasted with testimonies from relatives of victims; they transform a tour of the memorial into an enhanced experience, directly connecting the architecture to the perpetrators voice. Both can help learners to find adequate answers to the complex question of how these crimes were humanly possible.

Particularly in a memorial site that commemorates crimes against those who were castigated as physically and psychologically handicapped, digital educational content—be it textual, visual, audio, or film—can be specifically adapted to the users' needs and therefore meet the highest standards of accessibility and inclusivity in a user-centric way. Moreover, the inherently interactive design of the 3D model allows visitors the opportunity for actively engaging with and learning from the historical sources. Integrating the 3D model into the methodological approach of euthanasia education, would mean to offer new ways of learning about this challenging content before and after a visit. We aim to use the model to help learners prepare on-site peer-to-peer guiding before a potential visit or revisit the site in a follow-up activity together with their teachers, potentially adding their own content to a "virtual tour" reflecting on their experience and adding additional historical sources. This kind of active learning has the potential to enable the learner to construct conceptual meaning and understand the subject on a deeper level (Blancas et al., 2021).

Addressing the conference theme, we argue that the virtual space can be utilised as a tool to reinvent the educational purpose of a commemoration site and to enhance the visitor experience. At the same time, the question of how to create an emotional connection between the digital user and the historical site demands further critical discussion:

- How can the virtual space create social interaction and dialogue between the users in a meaningful way?
- How can memorial sites like Bernburg teach empathy in the digital realm? (Verschure and Wierenga, 2021)
- How does digital education redefine the public responsibility of heritage sites of Nazi persecution?

The Bernburg 3D model prepares the ground for studying these questions for the case of euthanasia.

5. Acknowledgements

This project is funded by the European Union's Horizon Europe research and innovation program under grant agreement No. 101061016. The authors are solely responsible for this work which does not represent the opinion of the European Commission. The European Commission is not responsible for any use that might be made of the information contained in this paper.

Appendix A

Bibliography

1. **Blancas M., Wierenga S., Ribbens K., Rieffe C., Knoch H., Billib S., Verschure P.** (2021). Active Learning in Digital Heritage: Introducing Geo-localisation, VR and AR at Holocaust Historical Sites. *Digital Holocaust Memory, Education and Research*. https://link.springer.com/chapter/10.1007/978-3-030-83496-8_7
2. **Di Stefano, F., Chiappini, S., Gorreja, A., Balestra, M., & Pierdicca, R.** (2021). Mobile 3D scan LiDAR: A literature review. *Geomatics, Natural Hazards and Risk*, 12(1), 2387–2429. <https://doi.org/10.1080/19475705.2021.1964617>
3. **museen.koeln** (2020). NS-Dokumentationszentrum Köln—360° Rundgang. <<https://museenkoeln.de/ns-dokumentationszentrum/medien/rundgang.aspx>>[01.12.2023]
4. **Stiftung Gedenkstätten Sachsen-Anhalt** (2020). Handreichung für die Bildungsarbeit. Gedenkstätte für die Opfer der NS-"Euthanasie" Bernburg.< <https://gedenkstaette-berenburg.sachsen-anhalt.de/angebote/paedagogische-handreichung/>> [29.11.2023]
5. **Terezín Memorial**. (2017). Objects of the Terezín Memorial and the Historic Sites from the Years 1940-1945—Terezín Memorial. <<https://www.pamatnik-terezin.cz/map>>[27.11.2023]
6. **The Secret Annex**. (2018, September 25) Anne Frank Website <<https://www.annefrank.org/en/anne-frank/secret-annex/>> [01.12.2023]
7. **Verschure P., Wierenga S.** (2021). Future memory: a digital humanities approach for the preservation and presentation of the history of the Holocaust and Nazi crimes. *Holocaust Studies*. <https://doi.org/10.1080/17504902.2021.1979178>
8. **Wang, R.** (2013). 3D building modeling using images and LiDAR: A review. *International Journal of Image and Data Fusion*, 4(4), 273-292. <https://doi.org/10.1080/19479832.2013.811124>

Notes

1.

The special treatment 14f13 was a campaign aimed to kill elderly prisoners and those considered not fit for work from concentration camps. A total of around 4,500 men and women brought from the Buchenwald, Flossenbürg, Groß-Rosen, Neuengamme, Ravensbrück, and Sachsenhausen concentration camps were murdered in Bernburg. The victims included Jews, Sinti and Roma, Jehovah's Witnesses, so-called asocials, those imprisoned as "professional criminals" and homosexuals.

2.

A publicly accessible memorial opened in September 1989. In the mid-1990s, the state of Saxony-Anhalt took over its sponsorship and since 2007 the memorial has been part of the Saxony-Anhalt Memorials Foundation.

3.

<https://memorise.sdu.dk/>

4.

<https://poly.cam/>

5.

<https://www.sketchup.com/>

6.

The use of SketchUp is optional for small scans with only one scan. We took individual scans for each room, and SketchUp was used to combine them to a single model.

7.

<https://skfb.ly/oNQAP>

8.

<https://sketchfab.com/>

9.

<https://memorise.sdu.dk/berenburg-3d-model/>

Camilla Vang Østergaard (caust@imada.sdu.dk), University of Southern Denmark, Denmark and Esther Rachow (rachowesther@gmail.com), The Hebrew University of Jerusalem, Israel and Judith Gebauer (Judith.Gebauer@erinnern.org), Gedenkstätte Bernburg, Germany and Stefan Jänicke (stjaenicke@imada.sdu.dk), University of Southern Denmark, Denmark
