MEMORIALIZATION OF THE SPAÇ LABOR CAMP:
AN INVESTIGATION INTO DIGITAL METHODS

By Michael Clements, Leo Gross, Elizabeth Kirschner, and Zetta Rajaniemi

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Memorialization of the Spaç Labor Camp:
An Investigation into Digital Methods

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ABSTRACT

The Spaç Prison served as an Albanian labor camp from 1968 to 1992. Today, it is a cultural monument, but often overlooked, and its physical condition is rapidly deteriorating. This project explored digital reconstruction to drive interest in and preserve stories about the former prison. The project began with a review of prior work in the field of digital reconstruction. With this background, group members worked with computer modeling software, web technologies, and witness testimony to create a prototype. Through testing the prototype, they provided recommendations and strategies for future work. Culture Heritage without Borders – Albania sponsored this project.

Figure A.1 *Mining gallery entrance at Spaç. Photo courtesy of CHwB*

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- Zenel Drangu and Fabian Kati for sharing their stories of the Spaç Prison. They gave a human side to the project.
- Our main contact at CHWB, Mirian Bllaci. He drove us to new heights in exploring heritage.
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- Kristi Zoto, for his work in translation, and for lending a young Albanian perspective to the project.
- The anonymous respondents who reviewed our prototype. Their feedback proved crucial to understanding digital reconstruction.
- Forensic Architecture. Their work in digital reconstruction is both technically and emotionally inspiring.
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EXECUTIVE SUMMARY

Under Albanian communism, the Spaç Prison was a huge compound spanning two hillsides, surrounded by barbed wire and watchtowers. The communist regime forced hundreds of prisoners to labor there. The prison has cemented its place in cultural memory for its status as a political prison and labor camp.

Contemporary interest in the Spaç Prison hardly reflects the intensity of its history. The compound has crumbled. Only a few core buildings remain standing. On one hill, a Turkish owned mining company has begun work, bulldozing some of the ruins of the camp in the process. Our sponsor, Cultural Heritage without Borders (CHwB), had to perform structural interventions in 2017 to prevent several buildings from collapsing completely. While a previous Albanian parliament declared Spaç a cultural monument in 2007, legislators did not provide funding to preserve the site. In fact, it was only through support from Swedish government that CHwB was able to intervene at Spaç.

CHwB wants to keep the Spaç Prison intact. They want it to live up to its potential, both in prompting those who suffered there to share their experiences, and to help a new generation better understand the past. CHwB believes they can help the public see the former prison as part of this constructive conversation, making the place a “resource for collective healing (Bllaci et al., 2016, p. 6).” They

Figure E.1 *A site photo from Spaç. Courtesy of CHwB*

Figure E.2 *Drangu pointing out former mining locations to Bllaci during on-site interview.*

see Spaç as a potential asset in facilitating a productive dialogue around the communist past.

Our project sought to explore a novel approach to help Spaç reach its potential. Digital reconstruction is a promising new technique. Digital reconstruction has provided a thorough depiction of the notorious Auschwitz concentration camp to the whole world (http://panorama.auschwitz.org) and shown the public the inside of a Syrian military prison where journalists aren't welcome (https://saydnaya.amnesty.org/).

The core approach of our project was to create a prototype digital reconstruction. We wanted to use our prototype to evaluate the ability of digital reconstructions in starting dialogue and transmitting memory of the communist past to younger generations of Albanians. Creating this prototype required as a first step collecting testimonies, documents, and photographs of the Spac site. Working in parallel due to only seven weeks in country, the team explored and became familiar with tools and techniques from other pertinent digital reconstructions.

The third prong of our parallel efforts included collecting new testimony by visiting the Spaç Prison with Zenel Drangu, who served a 16 year sentence there. By walking the physical site with someone who knew it well, we began to mentally visualize the various working parts of buildings still standing and others that no longer were there. During this walk with Zenel, our team recorded his emotional testimony about what happened to him at Spaç. Our access to Drangu, and his stories, provided a testimonial basis for a prototype digital reconstruction of the Spaç Prison.

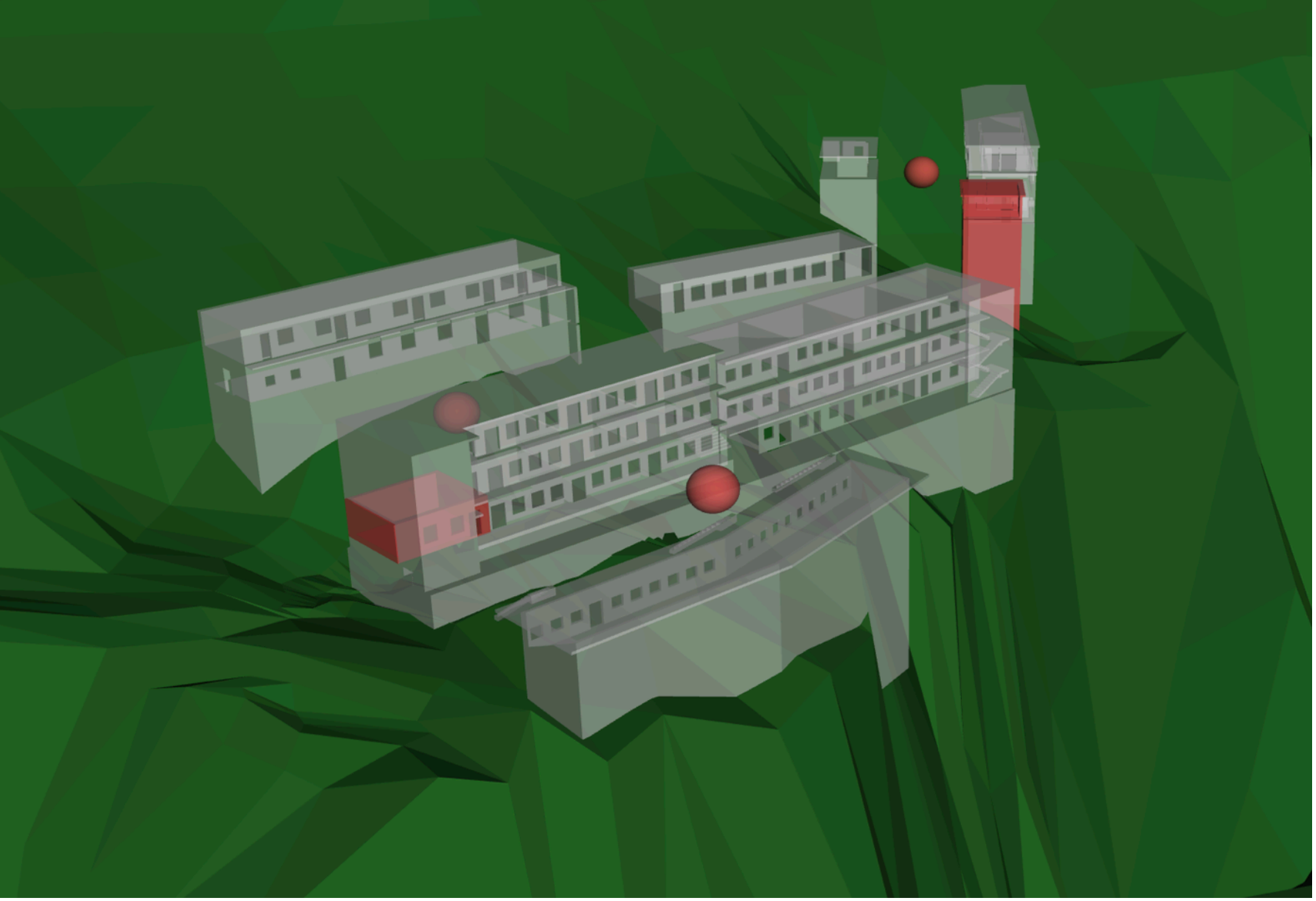

Figure E.3 *Main 3D display.*

In addition, we poured through archival documents, with the help of our translator, Christi Zoto. There have been a great number of photographers, poets, journalists, and architects working with Spaç Prison in the past. Our team created translations of testimony, collected architectural plans of the standing buildings, and viewed historical photographs of the site when it was in use by the communist government. This information, combined with Drangu's testimony, motivated us to create a working prototype in a short period.

We worked closely with CHwB to make this prototype digital reconstruction. Our team met daily with their architectural and heritage staff. Our focus included creating a a digital reconstruction while leaving time to test the effectiveness of our techniques, and serve as the foundation for a more complete reconstruction. We used a wide variety of tools, from CAD software to Web development applications. While we could not hope to model the entirety of Spaç Prison, nor the complexity of how it developed over its three decades of use, we selected elements of the prison that we could meaningfully represent with the time and resources available.

We chose to focus on creating 3D models of both the standing buildings within the inner part of the prison, and the surrounding terrain. Since the Spaç Prison was a multi-building compound, the prison includes both the buildings where prisoners lived and the outdoor areas between them. A complete digital reconstruction would include every building, standing or destroyed, that prisoners or guards used. It would also include all outdoor areas that prisoners might visit during their sentence, either as part of their work mining, or as part of their daily life. The core buildings were feasible to recreate thanks to architectural plans CHwB created in service of the 2017 structural interventions. Using

Figure E.4 *Interview Kati as he interacts with digital model. (From left to right) Bllaci, Kati, Zoto, Clements and Rajaniemi.*

online elevation data, old military maps, and satellite photos, we created a 3D model of the terrain.

By posting their digital reconstructions on the World Wide Web, many developers have enabled a broader audiences to experience them and share them on social networks. To allow our prototype to do the same, we prioritized making a website. Using Javascript we were able to create a web-based display for 3D models, that illustrates both the terrain and the buildings. Subsequently, we situated the buildings in their correct place on the terrain model.

We also created a system for highlighting certain parts of the prison. Even within the core buildings and the area around them, we had more testimony around certain areas. The family meeting room was one area about which we had rich testimony. Drangu not only explained the hardship of the short, heavily watched meetings that prisoners were allowed with their relatives there, but also shared a story from when his family came to visit him. This poignant story he shared included a near brush with death, the hardship of a long journey, and the importance of his family to him. We highlighted important rooms, such as the family meeting room, in a bright red color in the reconstruction model. Our design enables users to click on these rooms, and see a page providing context, images, and testimony.

With this working prototype, the next phase was testing. We conducted an important test with another former prisoner. Fabian Kati, who served three years at Spaç towards the end of the communist regime, met us at the CHwB office. We interviewed him about his time at Spaç, and then asked him to interact with our model (see figure E.2). We used a technique invented by Forensic Architecture, a prominent private agency

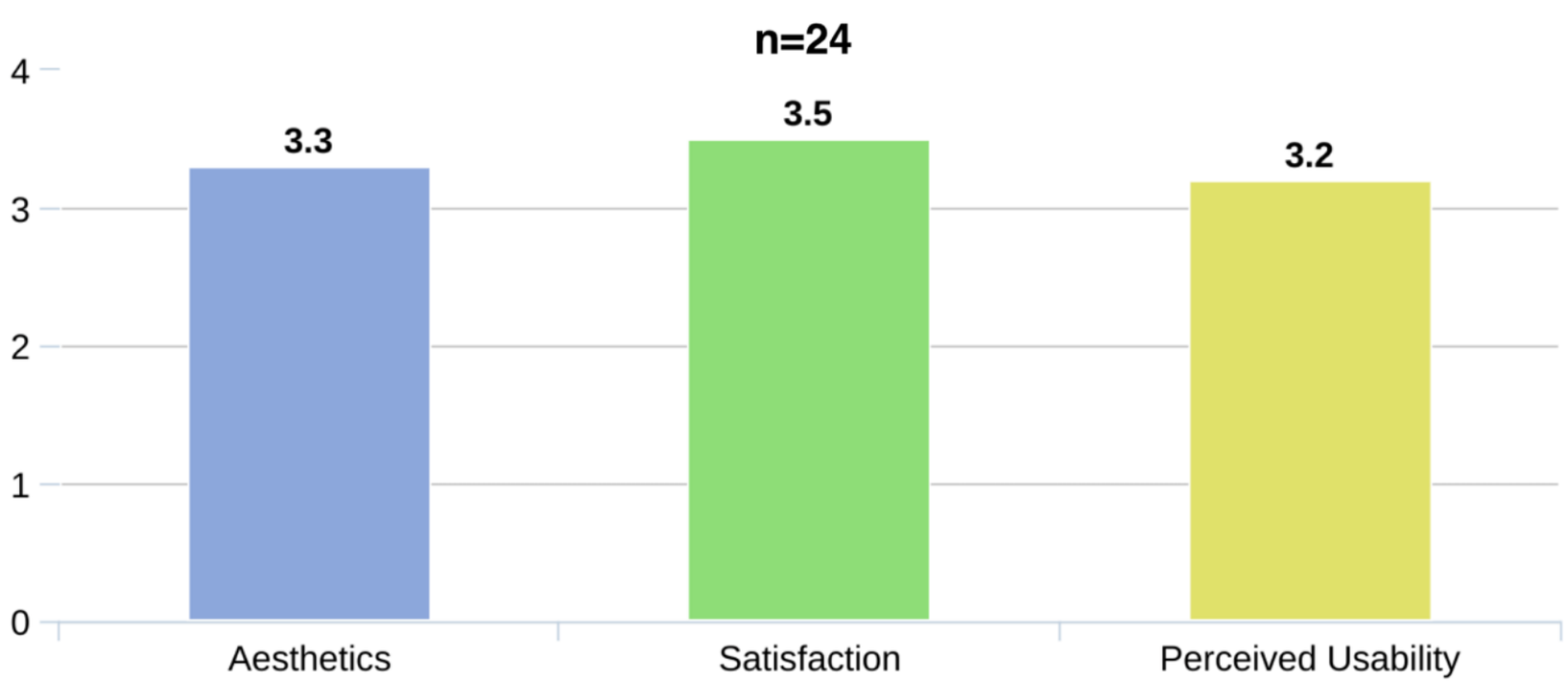

Figure E.5 *UES category scores*

which has published many digital reconstructions, called situated testimony. Fabian Kati's ability to use the model to indicate the location, purpose, and shape of buildings which we did not include reinforces Forensic Architecture's claim that this technique is an effective mechanism to expand a digital reconstruction. It also highlights this as a potential avenue for the expansion of the model.

The following step in our research was to send the model out to the general public via an online survey. Particularly, we collected responses from the Albanian generation for whom the Spaç Prison is entirely history, namely, adult Albanians born after the fall of communism. The goal of our survey was to measure the level of connection between our users and the prototype. Literature suggest that engagement is a key criteria for all digital media, and that failing to engage users interferes with a website's "transmission of information (O'Brien & Toms, 2008, p. 1)." We therefore adapted the User Engagement Scale, a well-studied, survey-based methodology for measuring user engagement in digital interactions (Wibea, 2013). In addition the surveyed users identified the parts of the prototype that resonated most with them.

Our measurement of the key factors of user engagement appear in figure E.2. High ratings across these areas suggests overall user engagement (Wibea, 2013). Our aesthetics rating of 3.3 indicates users found the experience appealing, which is a prerequisite for curiosity and exploration of new ideas (Attfield et al., 2011). The satisfaction rating of 3.5 indicates relatively strong endurability, which implies users will remember their time interacting with the prototype. This is necessary for a digital reconstruction in its role of transmitting memory to new audiences. The category score for perceived usability was 3.2, which literature suggests is vital to ensure users spend adequate time interacting with the digital reconstruction to explore its contents, and understand what it depicts (O'Brien & Toms, 2009).

When we asked the respondents what stories or parts of the model most affected them, one story stood out. Six respondents out of 24 singled out our presentation of Drangu's story concerning his family visiting him. One respondent said that the story reminded them of their own family's memories, saying they knew "some similar [stories] told by [their] grandfather's brother" another shared that their "mother's side of the family were all persecuted and both [their] grandparents spent time in prison[.]" These responses indicate that the prototype can encourage users to consider and share their family's history.

Given the level of engagement, the new memories this digital reconstruction can transmit to its audience, and the old memories it can evoke, we believe that a complete Spaç Prison digital reconstruction would be useful in transforming Spaç Prison into the "resource for healing" that CHwB believes it could be (Bllaci et al., p. 4). A detailed reconstruction could enhance the former prison's capacity to serve as a cultural monument, and to foster dialogue around the communist past. As CHwB continues their work in using digital reconstruction to facilitate dialogue, the following is our list of recommendations.

1. Collect More Testimony to Improve the Digital Reconstruction

We suggest that future work on the model involve the collection of testimony from a much broader selection of sources. The prototype contains stories from two interviews of former prisoners, and published testimony from two others. We recommend that CHwB, or any other party interested in expanding the model, focus on collecting more testimony that is strongly associated with locations in and around Spaç. Forensic Architecture's situated testimony is a useful technique for this endeavor. Our interview with Fabian Kati suggests that using our prototype for situated testimony could help CHwB collect information about many of the parts of the Spaç Prison which are not currently in our model.

2. Continue Modeling Spaç Prison

We recommend that CHwB continue creating 3D models of the Spaç Prison. Our model does not depict some standing and many ruined buildings. As a result, there are stories concerning Spaç which our model cannot present. Further work in modeling buildings would enable the digital reconstruction to present these stories. The strong impact of Drangu's family visitation story on users suggests that it is important to expand the model, in order to enhance its ability to share stories. This expansion will enhance reconstruction in its ability to facilitate dialogue.

3. Implement Additional Features from Other Digital Reconstructions

Our prototype included features like 3D modeling, scrollable text, integrated 360 photos, hotspots, and clickable buildings, which we found in other digital reconstructions. Our survey indicates that users found this design engaging and usable. Other features that could be borrowed from existing digital reconstructions include labels for 3D models, displaying a satellite photo as part of the terrain, and the ability to easily switch between languages. We recommend that CHwB seek partnerships with university computer science students to continue implementing new features that can improve the digital reconstruction.

Figure E.5 *Site photo of Spaç. Courtesy of CHwB.*

This project explored the possibility of using digital reconstruction to improve the usefulness of Spaç Prison in facilitating dialogue. We interviewed former prisoners, constructed a prototype digital reconstruction, and performed user testing. In this way, we illustrate the potential for strong personal connections between users and stories through digital reconstruction. Our project provides recommendations to CHwB, which can serve as guidance in continuing to explore this new way of helping the Spaç Prison reach its potential as a cultural monument.

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Figure 1.1 *Ariel drone photo of Spaç Prison. Courtesy of CHwB.*

INTRODUCTION

When witnesses to traumatic events pass on, their stories and behaviors survive in the memories of those who come after them. Experts call these surviving impressions of past events postmemory (Hirsch, 2008). These experiences can be transmitted so deeply, that they affect individuals as if they were firsthand. Both memory and postmemory significantly inform human behavior, emotion, and perception of the past and future. Because these forms of memory have such a strong effect on people, an important goal of large groups is to successfully communicate individual memory to the group as a whole. Through the process of communicating memory “values, protagonists, plots and narratives are appended to heritage (Viejo-Rose, 2015 p. 4).” Therefore, it is a social conversation around memory and postmemory which determines heritage.

In Albania today, the transmission of memory is particularly difficult. Professor Lori. E. Amy, an independent scholar who has published widely on recent Albanian history and cultural trauma believes that there is a “traumatic rupture between individual and collective memory” in Albania (Bllaci et al., 2016, p. 2). While normally literature, art, schools, and social spaces communicate experience across generations, Professor Amy believes recent history has broken these “lines of transmission”; that the “cultural violence” of Albanian communism has “repressed” and “manipulated” these social institutions (Bllaci et al., 2016, p. 2). She believes the post communist generation has inherited a fragmented and distorted view of the past.

An exemplar of the communist regime’s brutality sits crumbling, on a remote mountainside in Mirdita (see figure 1.2), one of the poorest regions of the country. The now abandoned Spaç Prison was once a forced labor camp. The regime sent common criminals and political prisoners to Spaç to work in the copper mines. Poets and journalists served long sentences for agitation and propaganda side-by-side with those convicted of violent crimes. Mixed in were informers and men whose only offense was trying to escape the country. The Spaç Prison was a large compound, spanning two hillsides, and holding more than a thousand prisoners (Cultural Heritage without Borders - Albania, & Sweden Sverige, n.d.).

In 2007, the Albanian Parliament declared Spaç a cultural monument, the only one of its kind from the communist era (Mejdini, 2018), but the future of the site remains uncertain. Looting has plagued the abandoned prison for years. It now sits in a state of advanced decay as illustrated by figure 1.3, having lost several buildings over the last two decades.

In 2017 Cultural Heritage without Borders (CHwB), this project’s sponsor, performed structural interventions to prevent the collapse of three of the remaining buildings. Spaç embodies the damaged lines of memory transmission in Albania. While it serves as a cultural monument, a tool for transmitting memory, it has been barely spared physical destruction (see figure 1.4).

Our sponsor wants to keep the Spaç Prison intact. They want it to live up to its potential in helping pass on the individual memories of those who suffered there to a new generation. CHwB believes they can help the public see the former prison as a “resource for

Figure 1.2 *Map of Albania showing Spaç’s location (Google, n.d.).*

collective healing (Bllaci et al., 2016).” They see Spaç as a potential asset in the dialogue which cultural violence has damaged. This project seeks to explore new techniques to help Spaç Prison reach its potential.

With Spaç’s advanced decay and remote location, our sponsor is interested in innovative techniques for bringing the lived experiences and recollections of those who served sentences at Spaç to new audiences. The field of **digital reconstruction** is particularly promising. Digital reconstruction has exhumed and depicted the inhuman practices of Auschwitz at a time when few survivors of the camps remain alive; other efforts convey the experience of being inside a Syrian military prison where journalists aren’t welcome.

CHwB is hoping that a digital reconstruction will have the power to generate a new interest in Spaç. They hope that presenting the former prison in this new visual form will encourage people to visit the physical site. They also hope that a well-crafted model of Spaç Prison can generate heritage dialogue in its own right, and help with the transmission of memory directly.

One of our goals was to create a prototype digital reconstruction of the Spaç Prison. Because our sponsor was interested in pursuing a complete digital reconstruction, we focused on creating a software system that was consistent with their long term plans.

Figure 1.3 *Site photo of Spaç. Courtesy of CHwB*

Figure 1.4 *A site photo from Spaç. Courtesy of CHwB*

Our prototype had to be extensible. Our design, from its core, had to be one which CHwB could expand upon. We used only a subset of the archival data available to us and represented only some of Spaç's history. A core element of our design was ensuring that a future developer, with more time, testimonies, and records, would be able to continue working towards a complete digital reconstruction.

Our other goal was to study the impacts of our digital reconstruction, especially on Albanians born after the fall of communism. We provided our prototype to users for testing and evaluated their reaction to the software with an online survey, using prior work in the field of usability testing as a basis. The survey also collected demographics and explored their specific emotional reactions to the prototype in order to understand the potential social function a complete digital reconstruction could serve. We explored the usefulness of the model in both eliciting and transmitting the memory of those who served sentences at Spaç.

Figure 2.1 *Photo of Spaç Prison, date unknown. Courtesy of CHwB*

LITERATURE REVIEW

Creating a useful **digital reconstruction** of Spaç is a socially and technically involved task. This chapter will outline relevant existing knowledge. To understand what a digital reconstruction can accomplish, we first discuss recent work in memory studies. From there, we examine the difficulty around creating a dialogue concerning recent Albanian memory. The following section provides an overview of prior works of digital reconstruction, and how exactly digital reconstructions can function in eliciting and transmitting memory. This chapter then outlines the tools necessary to digitally reconstruct a place like Spaç Prison. Finally, the chapter explores frameworks for evaluating the products of digital reconstruction.

MEMORY, HISTORY, AND HERITAGE

In recent years, scholars of cultural heritage have placed an increasing amount of importance on memory. Attempts to explain the complex relationship between individual memory and the underpinnings of a more collective history has given birth to '**memory science**' (Viejo-Rose, 2015). This field uses memory to better characterize the functions of heritage artifacts. Rather than understanding 'being a part of heritage' as a property of an object, memory science treats heritage as a result of what people remember about the object.

Memory, as held by an individual who has experience with an object first-hand, or that they gain through their education and personal communications, lends a sense of narrative to artifacts. Memory is what makes an object feel like part of a story, or gives a sense of

Figure 2.2 *A sign in front of Spaç.*

continuity, or change. For example, when an American visits the original United States Constitution, their memories of living in America make that document feel like a part of their national story. Through memory, individuals or groups are able to identify physical things as alien and/or familiar to their lives. A pianist's understanding of music history might make them see an old harpsichord in a museum as alien in its design but familiar in its purpose. Through this process, individuals derive meaning. Indeed, Dr. Viejo-Rose (2015) of Cambridge suggests, without memory, heritage would be nothing more than a collection of "old things (2)."

We can break down some of the memory functions of heritage artifacts using terms like "trigger," "container," "anchor," and "communicator" (Viejo-Rose, 2015). We can use these terms to describe heritage artifacts in terms of memory. This allows us to understand traditionally accepted heritage sites and artifacts in new ways. For example, an old courtroom might trigger memory in someone who received a sentence there, prompting them to share the story of their trial. A historical account might contain the memory of its author, preserving it for future generations. A monument at an internment camp can anchor a family's stories of persecution in one specific place and time. An expressive war monument may communicate the hardship of service to those born long after the armistice.

MEMORIES OF ALBANIAN COMMUNISM

Four decades of oppressive dictatorship shape recent Albanian history and personal lives. Researchers argue that this time has far-reaching implications for Albanian society. Lori. E. Amy (2010), an independent scholar who has published widely on recent Albanian history and cultural trauma, suggests that a paradox of identity has arisen out of this legacy of oppression. She argues that Albanians have no clear framework for integrating individual experience with collective memory and suggests that private memories remain unarticulated and unanalyzed as a result. This lack of synthesis leaves room for countless paradoxes between personal and collective identities. She further asserts that the lack of serious effort to address the legacy of Albanian dictatorship is a serious obstacle in modern Albanian politics (Amy, 2013). Failing to address the communist past has created “emotional as well as intellectual opposition” to structures other than a one-party totalitarian state (Amy, 2013, p. 9).

The Office for Security and Cooperation in Europe (OSCE) conducted a survey “to inform its on-going work to support inclusive national dialogue about dealing with Albania’s Communist past (OSCE, 2015, p5).” In the survey, the OSCE asked adult Albanians about their perception of communism and its legacy (results are shown in figure 2.3) (Organization for Security and Cooperation in Europe, 2016). More than half of Albanians thought communism was “a good idea, implemented poorly” or “a good idea, implemented properly.” On the other hand, more than one third thought it was “a bad idea.”

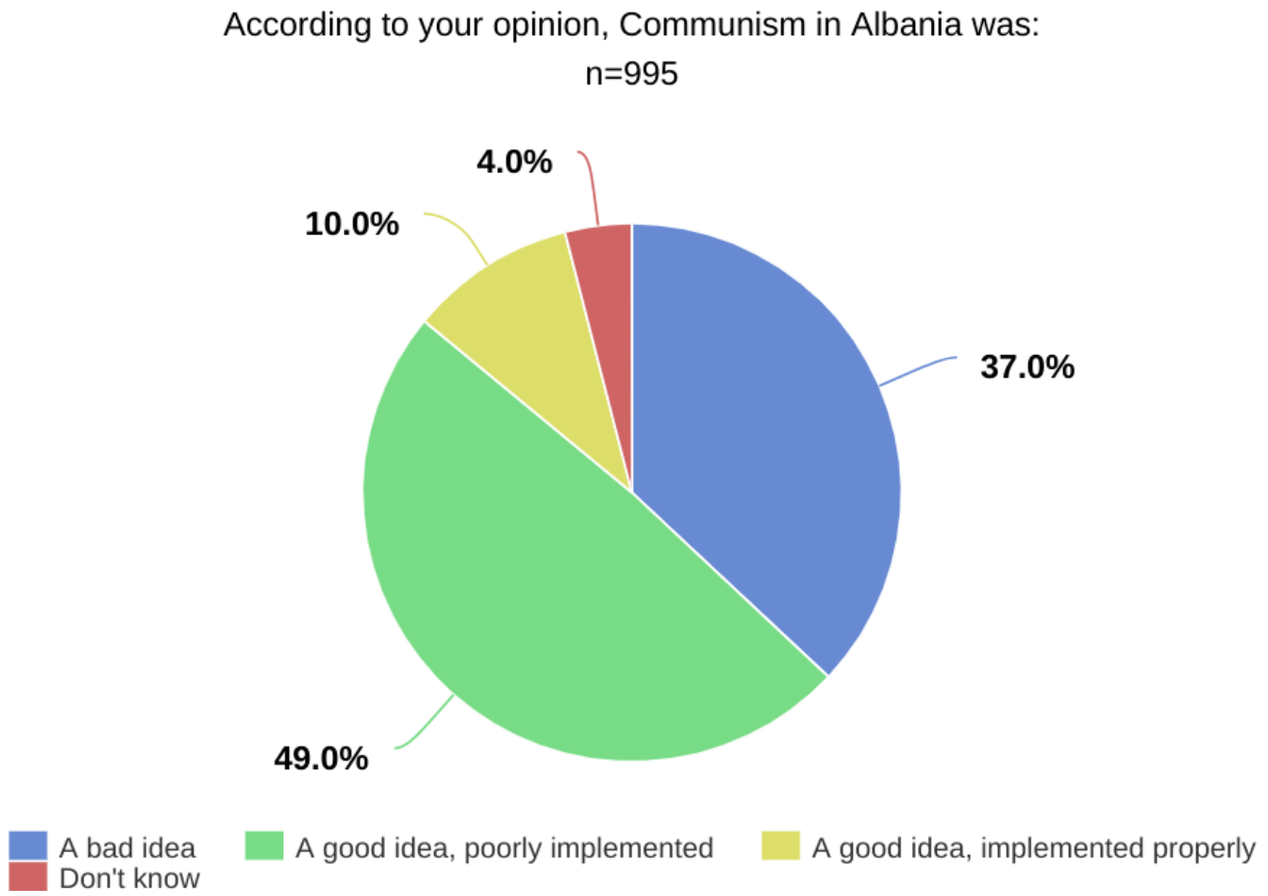

Figure 2.3 *Graph adapted from information from the OSCE (Organization for Security and Cooperation in Europe, 2016).*

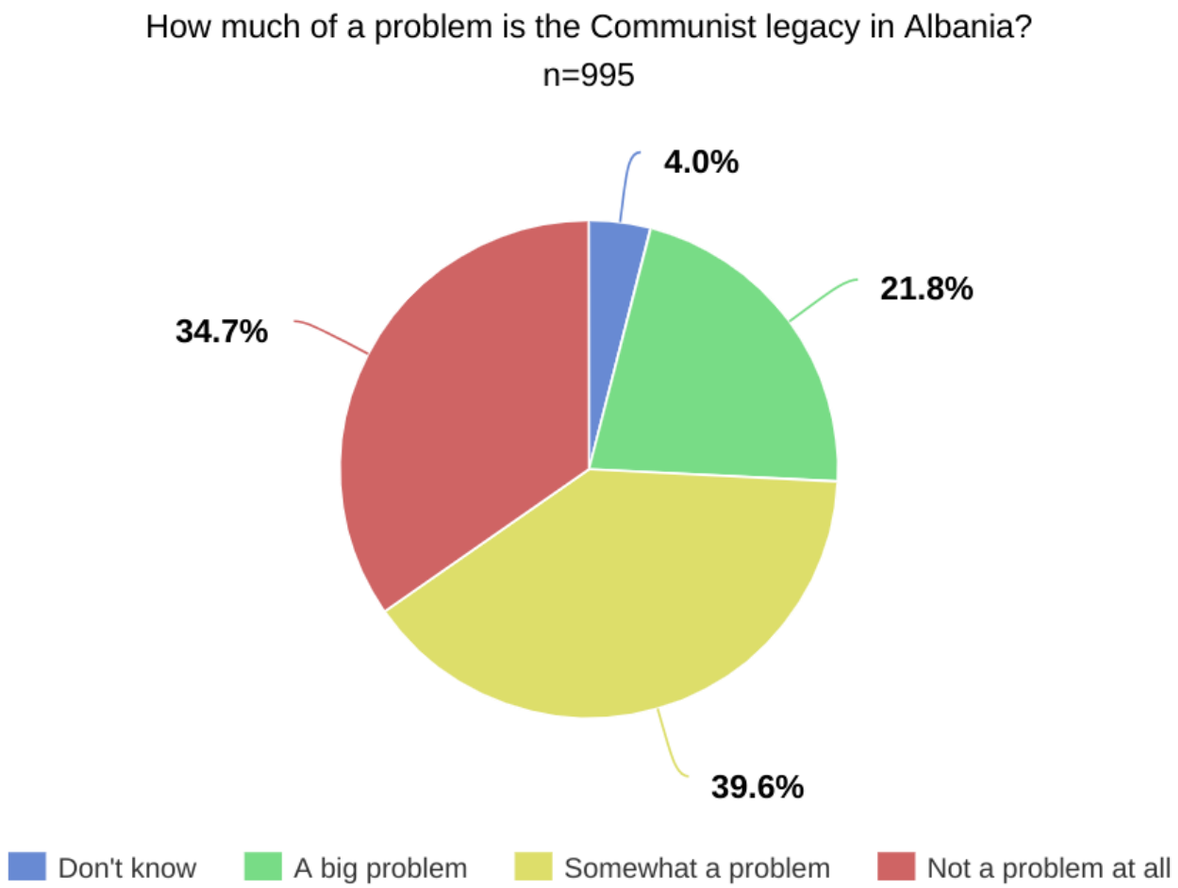

Figure 2.4 Graph adapted from information from the OSCE (Organization for Security and Cooperation in Europe, 2016).

The OSCE (2015) found that there was no clear consensus on whether the legacy of communism is important to address. The OSCE asked Albanians to consider the importance of public policy issues. The survey asked whether each issue was “a big problem,” “somewhat of a problem,” or “not a problem.” Respondents placed more emphasis on issues like corruption and healthcare reform (see figure 2.4) than on the legacy of communism. Among respondents from formerly persecuted families, who comprised just over 19% of the total sample, 31% consider the legacy of communism a “big problem.” On the other hand, 34% of those from persecuted families consider it “not a problem at all." This points out an interesting obstacle in creating dialogue where individuals express their memory. It is difficult to start a dialogue when the participants don’t even agree on whether it is important to do so.

Reconciling the necessity for and difficulty of having a dialogue poses an interesting problem for Albania. The International Coalition of Sites of Conscience worked with CHwB to publish a toolkit for using Spaç to address this problem. The toolkit (2016) states that the “cycle of [physical] degradation” and “oblivion” experienced by Spaç prevents it from facilitating a “constructive dialogue” around the recent past, which would otherwise make Spaç Prison a “resource for healing (Bllaci et al., p. 9).” This observed discrepancy between Spaç’s potential and its actual use suggests that it may be useful to explore novel techniques, which could enhance this conversation.

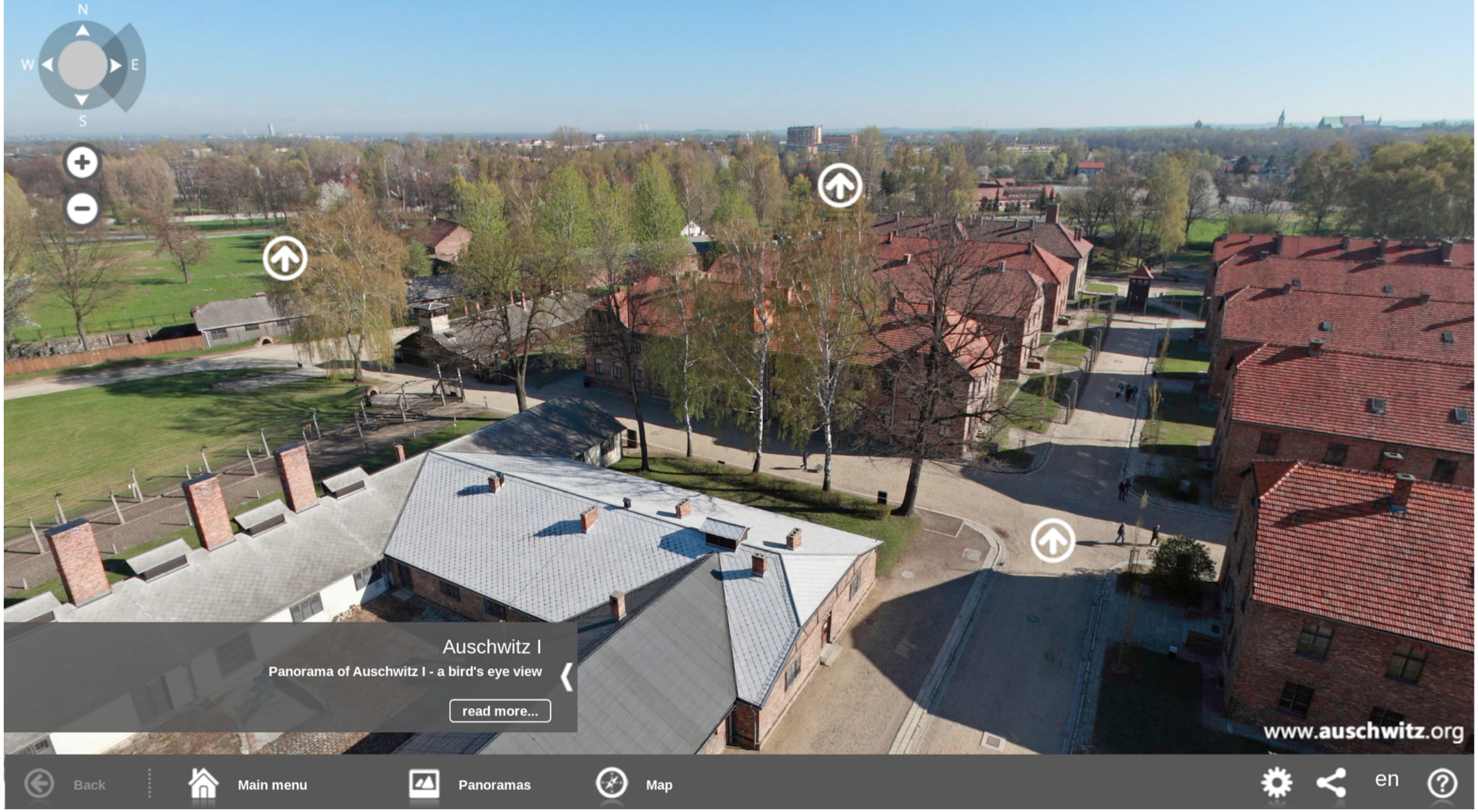

Figure 2.5 *Screenshot of the Auschwitz digital reconstruction (Memorial and Museum Auschwitz-Birkenau, n.d.)*

EXISTING WORK IN DIGITAL RECONSTRUCTION

Digital reconstruction is a form of digital media with many components and applications. To illustrate some of the presentation techniques, this section draws from two digital reconstructions of prisons which are publicly available on websites. The first presents a digital version of the notorious Auschwitz concentration camp, where Nazi Germany exterminated countless people and exposed others to horrifying conditions. The second is a digital reconstruction of the Syrian military prison, Saydnaya, which currently holds civilian and military prisoners, and is the alleged site of thousands of extrajudicial executions (Amnesty International, Forensic Architecture, 2016) Forensic Architecture, a British research agency, and Amnesty International created this digital reconstruction to raise awareness of inhumane conditions there. Finally, the following section examines the methods Forensic Architecture used to the Saydnaya model.

Figure 2.6 *Screenshot of the Auschwitz digital reconstruction showing the screen that appears after clicking the "read more..." button (Memorial and Museum Auschwitz-Birkenau, n.d.)*

Auschwitz Digital Reconstruction

The digital reconstruction of Auschwitz (http://panorama.auschwitz.org) consisted mainly of **360 degree photographs**, also referred to as panoramas, of the prison for visuals. These photographs covered every unique area of the prison. For example, the designers included all outdoor areas, but only the insides of two barracks buildings, with the argument that the remainder appear the same. Within each panorama, a user can click on a button to view a different area, collapse or expand a title for the specific location, or click to learn more about what they are looking at. All of these components as well as the screen that appears after clicking the "read more…" button are shown in figures 2.5 and 2.6 respectively.

Other important functions within the Auschwitz digital reconstruction are the ability to switch between Polish and English, eyewitness accounts for certain locations, and the overview site map. The site map allows the user to navigate between any two points on the website and uses different colored markers to distinguish between aerial views, exteriors, interiors, and your current location, as shown in figure 2.7.

Figure 2.7 *Screenshot of the Auschwitz digital reconstruction showing the overview site map (Memorial and Museum Auschwitz-Birkenau, n.d.)*

Saydnaya Digital Reconstruction

The digital reconstruction of Saydnaya (available at https://saydnaya.amnesty.org/) has a very different set of features than those utilized by Auschwitz. Although there is still a site map overview (see figure 2.8) and the ability to switch between languages (this time English and Arabic), all other techniques are different. Rather than using photographs, they display a **CAD** model of the prison. They labeled certain locations a user could click on to get more information. They also placed the CAD model on a flat surface, which displays a satellite photo, capturing the prison's surroundings. All of this can be seen in figure 2.8.

After clicking on a location, the website displays a new page dedicated to that location. The user can then click and drag to turn the camera angle and look around the entire room. These pages are complete with occupants, visual elements of the architecture, and links to stories containing personal testimonies (see figure 2.9).

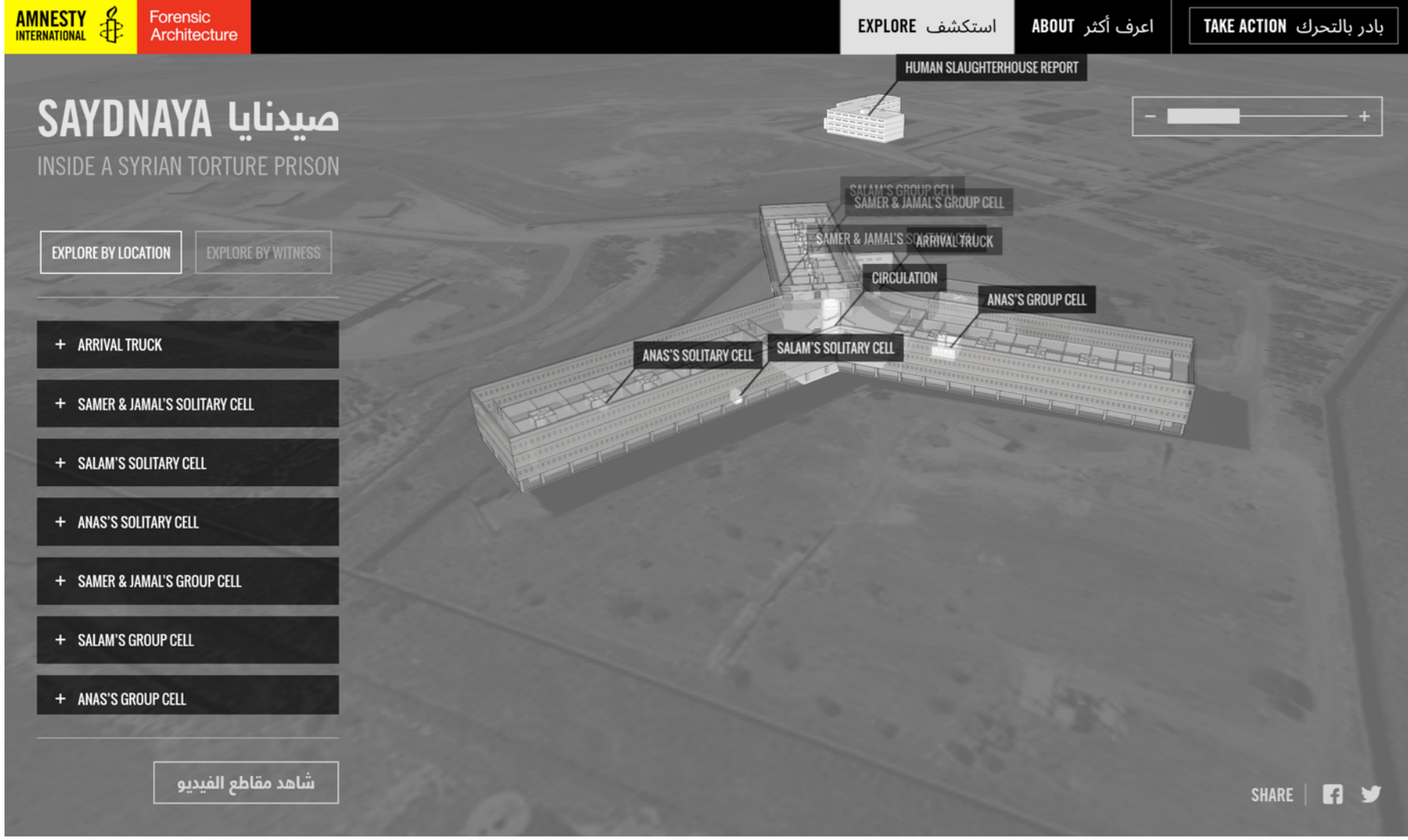

Figure 2.8 *Screenshot of the Saydnaya digital reconstruction showing the overview site map (Amnesty International, Forensic Architecture, 2016).*

After clicking on one of the links within a location, such as the one labeled as "The Six Title Rule" circled in red in figure 2.9, a video showing a former inmate participating in the creation of that location appears (for a screenshot, see figure 2.10). This often involved the former inmate describing the locations, their experiences within the prison, and the sounds they heard to engineers (Amnesty International, Forensic Architecture, 2016). The engineer would then use these testimonies to recreate the physical locations. The audio was also recreated using a process called acoustic modeling (engineering the sounds of a space with technology rather than capturing them directly with recording equipment) and the descriptions given by former inmates (Forensic Architecture, n.d.). The audio was then added into the representation of the location so that the website felt more complete (Amnesty International, Forensic Architecture, 2016).

This technique of recreating a space which is inaccessible by relying on witness testimony is a core component of the emerging field of forensic architecture. The organization Forensic Architecture has published widely, and pioneered several techniques in this field (Forensic Architecture Agency, n.d.).

Figure 2.9 *Screenshot showing the inside of one location within the Saydnaya digital reconstruction (Amnesty International, Forensic Architecture, 2016).*

Forensic Architecture

Forensic Architecture uses a large number of techniques to create digital reconstructions. In creating Saydnaya, they began by using satellite photographs, maps, and other available data to create a model of the military prison. After creating an initial model, Forensic Architecture used a technique they refer to as "**situated testimony** (Forensic Architecture, n.d.)." This involves presenting witnesses with a preliminary version of the model and asking them questions about it. This allows the designers to have witnesses correct errors in the model. In addition, seeing a visual display can often help prisoners recall details which they had forgotten, or prompt them to share specific details and stories. In this way, an incomplete model becomes a tool for eliciting memory, and memory becomes a tool for creating a more accurate model.

Since memories are subjective, testimonies occasionally contradict each other. Forensic Architecture attempts to reconcile these contradictions, such as the shape of a room, as well as they can. They also make a note on their website about the model reflecting the subjective memory of the witnesses who helped create it.

Figure 2.10 *Screenshot of modeling Saydnaya (Amnesty International, Forensic Architecture, 2016).*

TECHNICAL BASIS FOR DIGITAL RECONSTRUCTION

Creating the components of a digital reconstruction requires a great number of techniques and tools. Many of these tools are specifically for engineers, software developers, and other technically inclined users.

Computer Aided Design software, or **CAD** software, is the basis for modern engineering plans. Before the prevalence of this technology, drawing plans by hand was the industry standard practice for architects. With CAD software, the process continues from where hand drawing left off. After a user finishes drawing in two dimensions, they then **extrude** the 2-D drawing into a third dimension.

Figure 2.11 shows this process, with the left half detailing the two-dimensional drawing, and the right half detailing the three-dimensional object. A user can create the two-dimensional drawing by referencing source material, such as pre-existing building plans, photographs, or by inventing the form themselves.

Another important tool for allowing these presentations to reach new audiences is the **World Wide Web**, colloquially known as the Web. The Web serves as a common forum for publishing many digital reconstructions. The technologies underlying the Web, such as **JavaScript** and **hypertext**, allow for immersive displays of information, which link different resources together and create expressive, multimedia presentations.

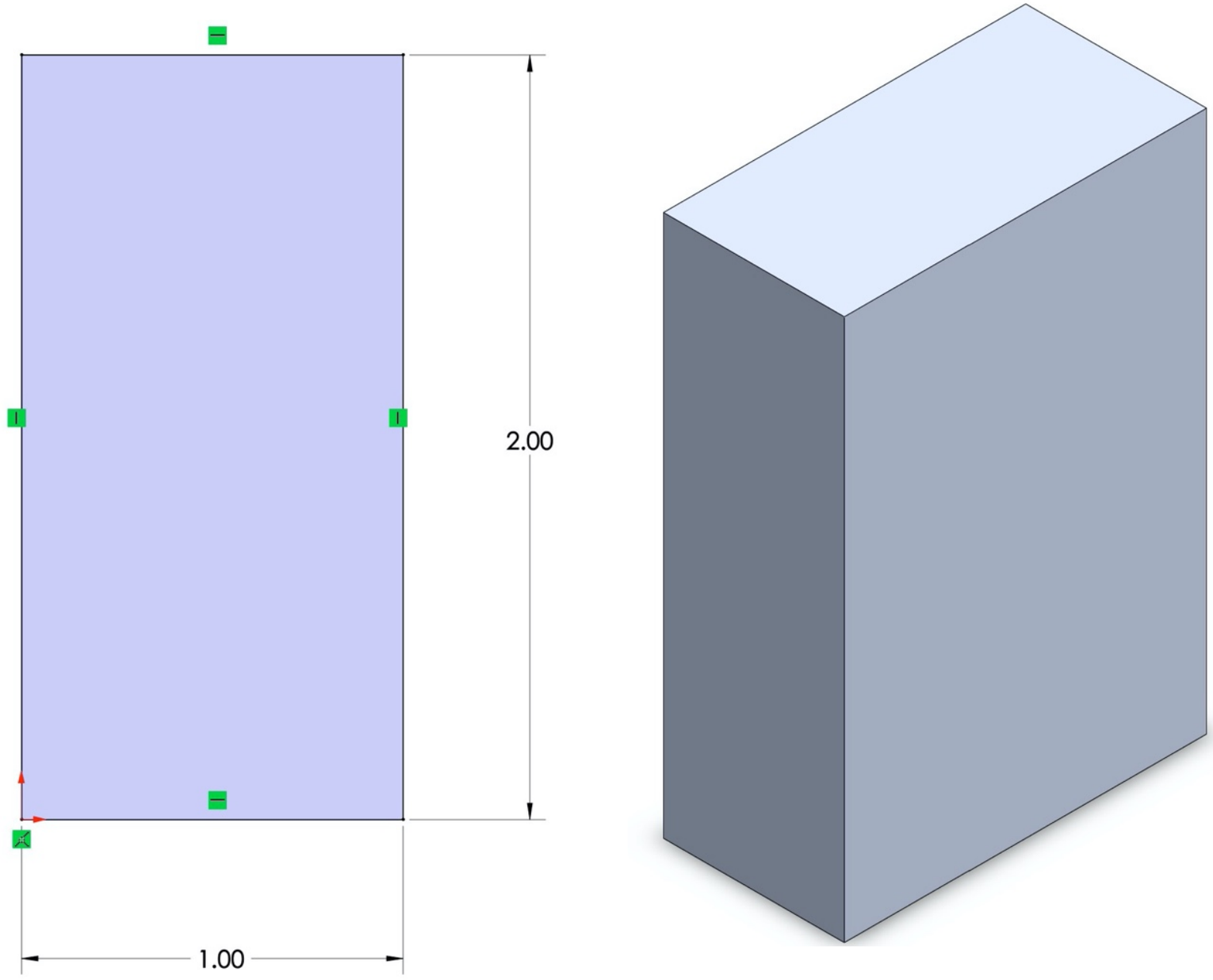

Figure 2.11 *Demonstration of Computer Aided Design principles.*

ASSESSING THE EFFECTIVENESS OF DIGITAL RECONSTRUCTIONS

Assessing whether museum exhibits are able to effectively communicate their message and create a lasting impact on their visitors is “an integral part of the exhibit design process” (Tucker, Bricker, Huerta, 2011). This is no different for a digital reconstruction. Careful evaluation of a multimedia presentation’s success at engaging online visitors is a necessary step similar to that of assessing the effectiveness of a museum exhibit. The four key criteria that make a museum exhibit successful are comfort, engagement, reinforcement, and meaningfulness. Comfortable exhibits are interesting and inviting spaces (National Science Foundation, 2005). To have a lasting impact on its visitors, a digital exhibit must be reinforcing and encourage visitors to continue through the exhibit (National Science Foundation, 2005). An exhibit that feels meaningful will have a long-lasting impact on its visitors (National Science Foundation, 2005). The final and most complicated of these four criteria is engagement.

Engagement

User engagement is the emotional, behavioral, and cognitive connection that exists between users and a resource (Attfield et al, 2011). This broad definition encompasses many interconnected emotional, behavioral, and cognitive characteristics to describe engagement (Attfield et al, 2011). Continued use or interaction is an outcome of user engagement (O’Brien & Toms, 2009) (Jacques, 1996). Engagement is a key factor in understanding user behavior in computer environments (Wiebea, 2013).

User engagement is key to the success of any online technology. In the past, the study of **human-computer interaction** focused solely on usability as a measure of engagement (O’Brien & Toms, 2008). Further research has suggested that usability is only one characteristic of user engagement (O’Brien & Toms, 2008). With today’s ubiquity of technology in day to day interactions, it is essential to design digital interactions that are not only usable, but also engaging. Failing to engage users “equates with no sale on an electronic commerce site and no transmission of information from a website; people go elsewhere” (O’Brien & Toms, 2008, p. 1). For online applications, **aesthetics**, **perceived usability**, and **satisfaction** are the key components of user engagement (Wiebea, 2013) (O’Brien & Toms, 2009).

Aesthetics describes the sensory, visual appeal of an interface (Attfield et al, 2011). Components related to aesthetics are screen layout, graphics, and the use of design principles such as **symmetry** and **balance** (Attfield et al, 2011). Aesthetic experiences promote focused attention and encourage curiosity (Attfield et al, 2011). Aesthetic appeal has a positive correlation with perceived usability (Attfield et al, 2011) (Tractinsky, 2000), even though no such correlation exists between perceived usability and actual usability.

Perceived usability describes the user’s emotional experience interacting with digital media (O’Brien & Toms, 2009). This emotional experience, or **affective** experience (O’Brien & Toms, 2009), is intrinsically motivating, and promotes further engagement (Attfield et al, 2011). Poor website design and navigational structures heavily impact a user’s perceived usability of a website (O’Brien & Toms, 2008). If a website is difficult to navigate or understand, it will hamper a user’s ability to engage with it (O’Brien & Toms, 2008). Bad web design causes frustration for users and will fail to engage them.

Satisfaction is a broad term, meaning a user’s enjoyment of an experience. This component combines **endurability**, how likely a user is to repeat or remember their interaction; **novelty**, new or unfamiliar experiences; and **involvement**, the personal connection the user made to the experience (Wiebea, 2013). An experience a user wishes to repeat is endurable, and makes users more likely to recommend the experience to others (Attfield et al, 2011). Interactive experiences can be engaging because they are novel, surprising, or unexpected (Attfield et al, 2011).

Since digital reconstructions are a form of digital media, user engagement is key to understanding their effectiveness. Measuring user engagement was a critical step in the creation of our prototype digital reconstruction. Conceptualizing these concepts critically informed our process in the design of our digital reconstruction prototype.

SUMMARY

The issue of Albanian memory is a particularly divisive social problem. The Spaç Prison has the potential to serve a vital role in the development of a productive discourse around the communist past as a cultural monument. Spaç's advanced decay and remoteness interfere with its ability to fulfill that potential. Digital reconstruction has presented sites to audiences that would otherwise not view them. Literature suggests that good design of digital tools can create an emotionally compelling experience. By applying such an effective digital reconstruction to the Spaç Prison it may be possible to facilitate interest in the site, leading to increased visitation and productive dialogue around the Albanian communist era.

Figure 2.12 *Collapsing mining gallery at Spaç. Courtesy of CHwB.*

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Figure 3.1 *Onsite Interview with Drangu, center. Gross, left. Bllaci, right.*

METHODOLOGY

Cultural Heritage without Borders (CHwB) plans to use **digital reconstruction** to generate interest in the Spaç Prison among adult Albanians born after the fall of communism. In order to study how to best approach this, and what it could potentially accomplish, we created a prototype digital reconstruction. The prototype has two major goals. The first is to allow us to test the impact of digital reconstruction. The second is to provide a basis for future teams to work on a more complete digital reconstruction of the Spaç Prison.

We started this process by trying to get a grasp on existing presentations of Albanian communism. Our sponsor then provided us with archival materials, from which we drew useful architectural plans and photographs. We interviewed two former prisoners, whose testimony was crucial to the creation and expansion of the model. Finally, we circulated the prototype and asked users to fill out a survey. Figure 3.2 outlines this process.

Figure 3.2 *Project Overview Graphic.*

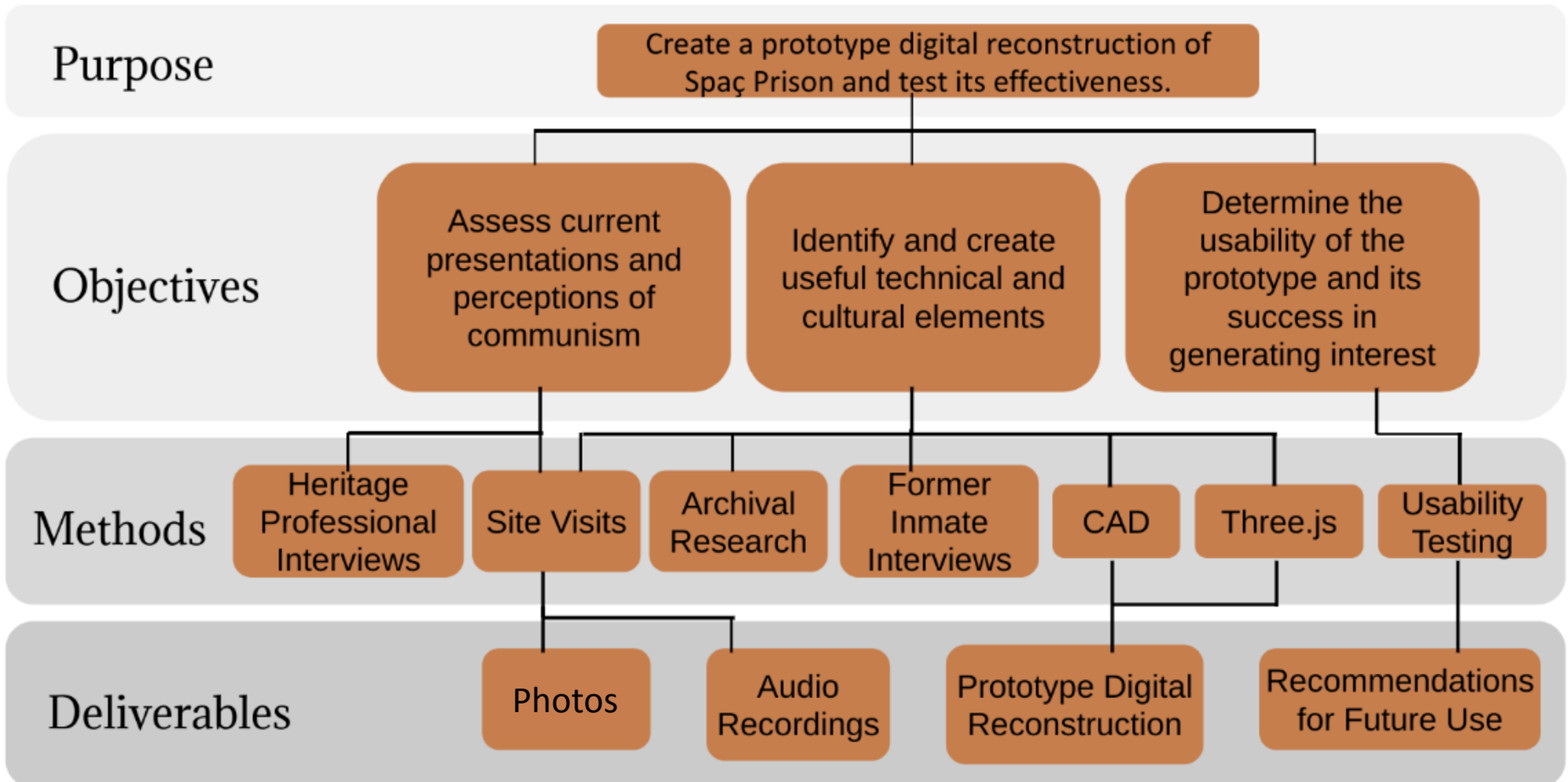


Figure 3.3 *Entrance way to Bunk'Art2 (Wikimedia Image).*

VISITING MUSEUMS TO UNDERSTAND ALBANIAN HERITAGE WORK

The team visited museums in Tirana to study their presentation of memories concerning the recent Albanian past. These museums were Bunk'Art2, the House of Leaves, and the National Historical Museum. Figure 3.3 depicts the entrance to Bunk'Art2

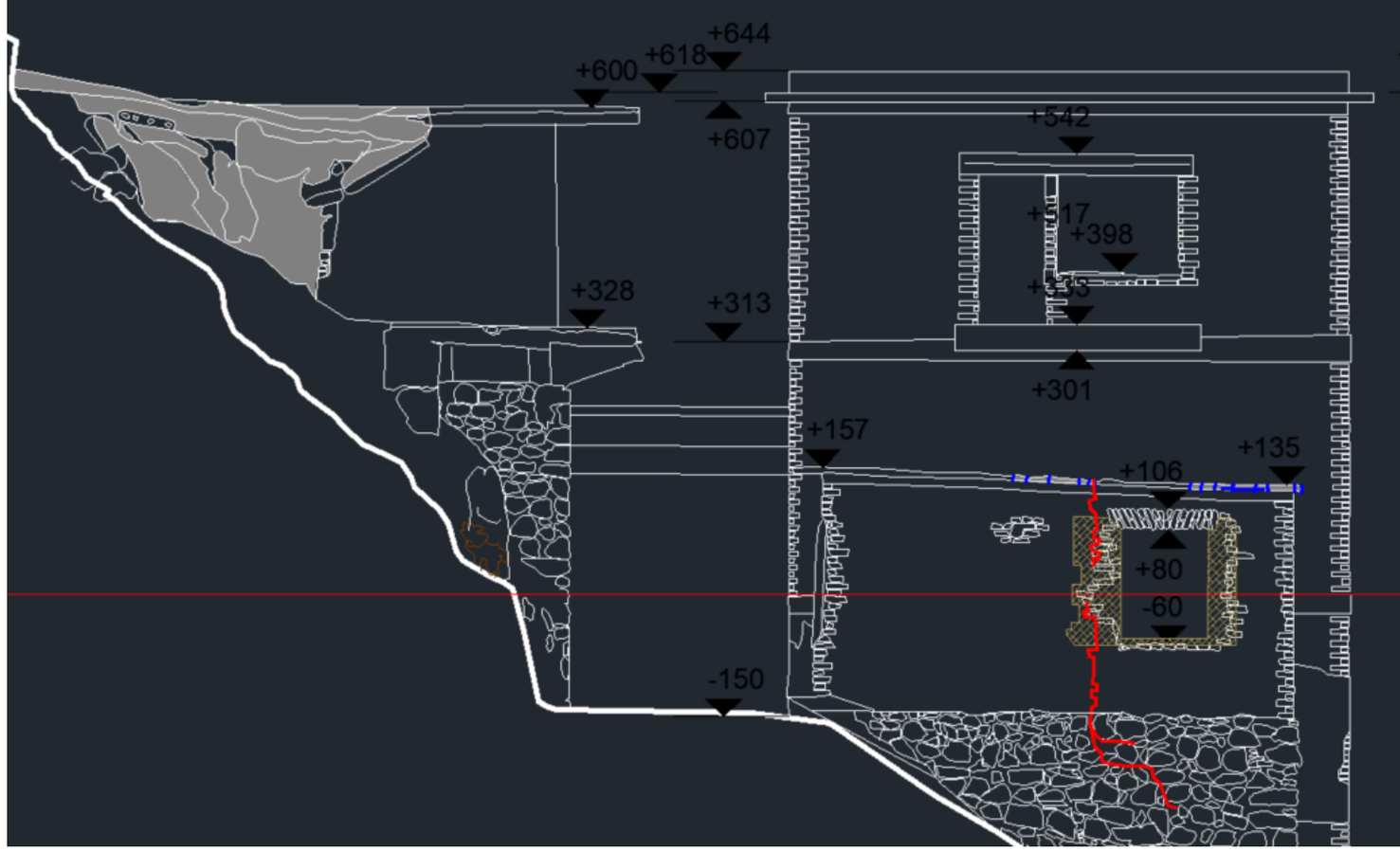
With this familiarity with the museums, the team reached out to a variety of contacts at the three museums. One museum professional agreed to schedule a meeting with us, a staff member from the House of Leaves. The purpose of the interview was to learn more about the public perception of the communist past and how the museum sought to teach about that era. We used a semi-structured interview style. One group member asked the museum official how the public responded to the content of the museum and what elements (displays, testimonies, objects) created this reaction.

GATHERING TESTIMONY AND ARCHIVAL DATA FOR OUR PROTOTYPE

To add powerful stories to our prototype digital reconstruction and ensure its accuracy, we needed to gather information. This section details our methods to collect this information. It includes the methods for information that we received from our sponsors, the media we recorded from site visits, and testimonies from our two interviews of former inmates of Spaç.

Figure 3.4 *Aerial drone photograph. The main prison site is visible on the right hand side.*

Figure 3.5 *Architectural plan of Building G3.*



Gathering Archival Data

Cultural Heritage without Borders provided us with access to their collection of archival material relating to the Memorialization of the Spaç Labor Camp:

1. Architectural plans for detailed measurements of the remaining buildings (e.g figure 3.5)

2. Drone photographs and maps provided for an overview of the physical layout of the site and the physical positions of the objects relative to each other (e.g figure 3.4)

3. Recorded and transcribed interviews of former prisoners held at Spaç to understand the day-to-day routines and the emotional significance of the physical site. (e.g figure 3.6)

Figure 3.6 *Historical photo of the main cell block. Courtesy of CHwB.*

CHwB also helped us visit the Spaç Prison site on two separate occasions to help us associate better with the physical location. We went inside of buildings, saw the extent of structural decay, and documented the current state of the former prison with photographs. The goal was to gather images of the site to help with the construction of the prototype digital model.

We used a handful of documentation tools while at the Spaç site. 360-cameras (as seen in figure 3.7) captured entire rooms or areas, giving a wider sense of space. Cameras show specific objects or 2-dimensional displays that we could not capture with a 360 degree camera.

Figure 3.7: *360-degree camera set up in the family meeting room at Spaç Prison.*

Figure 3.8 *Example of team member, Leo Gross, recording onsite interview of Zenel Drangu. Robert Hersh and Mirian Bllaci are also visible.*

Interviewing a Former Prisoner Onsite

With Program Director Mirian Bllaci as a translator, we visited the site to interview Zenel Drangu, a former inmate of Spaç Prison, (see figures 3.8 and 3.9) and to elicit his memories of the 16 years he spent at the prison from 1973 - 1989 (Zenel Drangu - kujto.al: Arkiva Online e Viktimave të Komunizmit në Shqipëri, 2018). Although discussing traumatic events can have negative effects on those sharing them, Drangu has shared his story about his time in Spaç several times previously so this was not a concern during this interview. We wanted to see what memories Spaç Prison could call to mind in somebody who had a difficult experience there. By conducting this interview on-site (figure 3.8), we could record stories from Drangu that describe specific locations and the prison as a whole. For example, when looking up at where the mining entrances used to be, he remembered their precise locations and what mining conditions were like (figure 3.9).

Our approach to this interview was to allow Drangu to speak as he guided us through the site. On this tour of the site, we wanted to ensure we brought Drangu to the family visitation area, his old cell (see figure 3.11), the rollcall platform, and the kommendant (see figure 3.10).

The tour started outside of Spaç, at a building Drangu identified as a former coal depot. While we prepared to

Figure 3.9 *Drangu pointing out former mining locations to Bllaci during on-site interview.*

Figure 3.10: *Roadway leading up to the main site. Kommandent building is visible.*

guide him to various parts of the prison, we wanted to let him tell his story in his own way. In the interview he provided us with his memory of the prison's conditions and his experiences there. Drangu also shared his opinions on the motivations of the people there. While the team did lead Drangu to certain areas, such as his old cell, we allowed him to stand and speak wherever he liked. One member took photographs, to document the process of Drangu sharing his memory about the site. Another team member recorded Drangu's testimony and the English translation provided by Bllaci using a field microphone. A third team member took

detailed minutes of the interview that we referred to when translating and transcribing the interview later. The fourth team member asked Drangu additional questions as necessary.

Following the interview, Kristi Zoto, a student translator working with the team, translated and transcribed the stories told by Drangu. We made careful note of which room or area Drangu had told each story in. These relationships between testimony and space informed our priorities in our prototype creation.

Figure 3.11: *Drangu in his former cell pointing to and detailing features of the room to Bllaci, Gross, and Hersh.*

Interviewing a Former Prisoner with the Prototype

CHwB provided us with an opportunity to interview a second former prisoner of Spaç, Fabian Kati. This in-person interview took place in CHwB's office in Tirana on Tuesday, November 19, 2019. We recorded the interview with both audio and video. Two team members were present for this interview, as well as Kristi Zoto and Mirian Bllaci (see figure 3.12). This interview did not require a translator as Kati spoke fluent English. We discussed his experience at Spaç as a political prisoner. This discussion included the reason for his conviction, what an average workday was like at the site, and general living conditions.

The first half of the interview was a broad conversation about Kati's time at Spaç. The goal was to contextualize any specific stories he told. We explained to him that we wanted to hear about his personal experience, and allowed him to share that in whatever way he saw fit. We did not interfere as he shared the thoughts and memories that came to mind.

In the second half of the interview we presented Kati with an early version of the prototype digital reconstruction. This version of the prototype included the core, standing buildings (as defined in Appendix A.) and terrain version 4 (see figure 4.9). We did not draw his attention to any part of the model. Forensic Architecture's technique of **situated testimony** inspired this approach. This version of the model included buildings, terrain, and **360 degree photographs**. Kati utilized the model and pointed to buildings and landscape features and told stories about the locations.

Following the interview, a team member transcribed the interview. We took advantage of the combination of audio and video captured. We counted the number of times Kati referenced the model, or used his cursor to clarify what he was talking about. This technique showed us places where the model was useful for anchoring his testimony. We also noted places where he remembered something which he had forgotten to disclose in the first half of the interview, to try to see what memories the model triggered for him.

Figure 3.12: *Image from interview with Kati. Zoto, Clements and Rajaniemi are attending, listed from left to right.*

CREATING A PROTOTYPE DIGITAL RECONSTRUCTION

Having collected stories, photographs, and descriptions of the physical location, the team began curating the content of the digital reconstruction. We worked closely with CHwB to make a prototype digital reconstruction. Our team met daily with their architectural and heritage staff. We quickly reviewed our progress, and spent up to an hour discussing our most pressing design goals. After our meetings, we would continue working on the model, presenting our progress and discussing our reasoning as we went along. We focused on creating a prototype digital reconstruction which would allow us to test the effectiveness of our techniques, and serve as a basis for a more complete reconstruction. As this was a lengthy process of trial and error which would distract from the overall methodology of this project, Chapter 4 provides a detailed technical breakdown of our design considerations. Appendix C lists the person-hours we invested into various tasks.

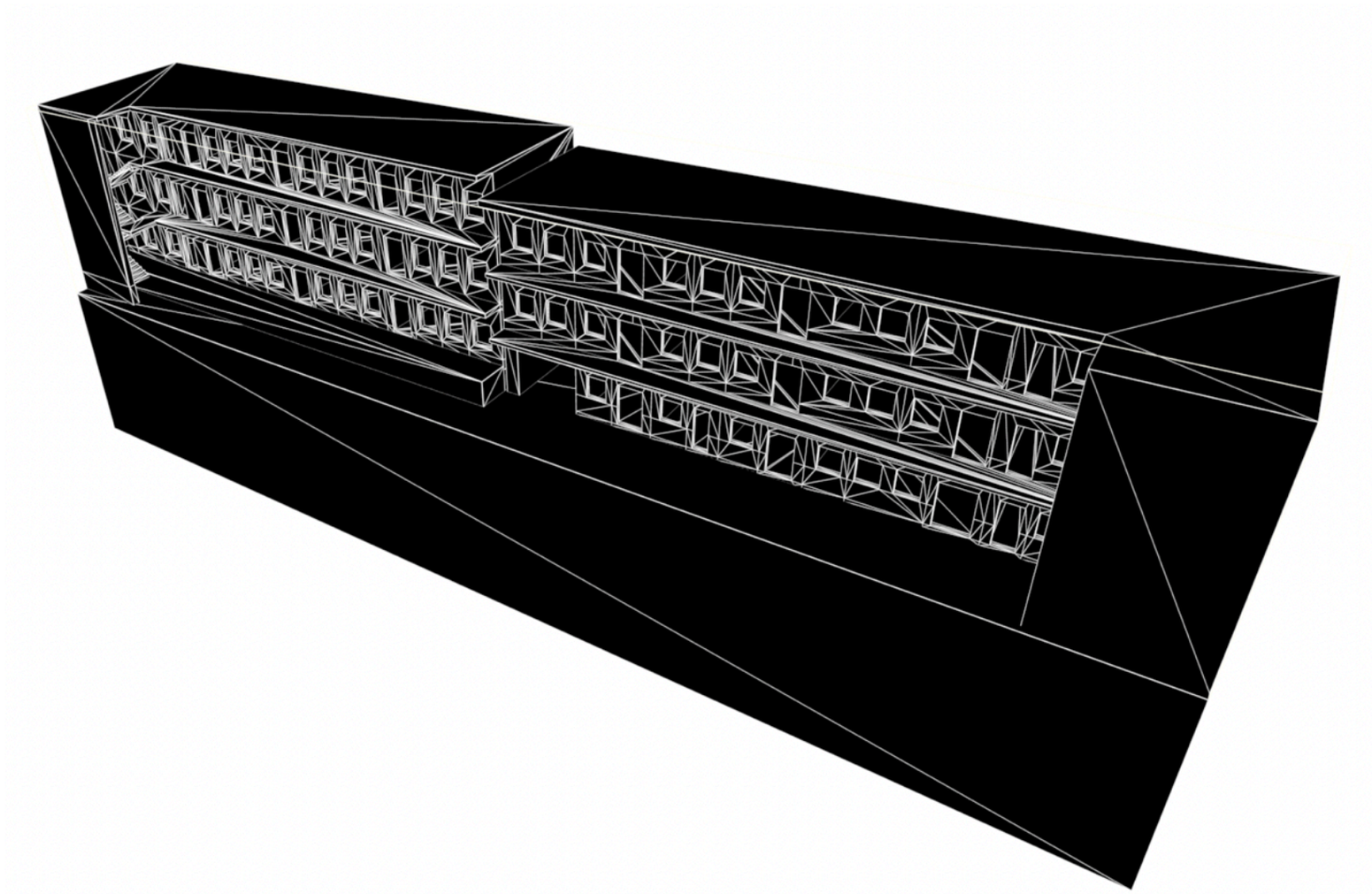


Figure 3.13 *Reconstruction of main cellblock.*

ASSESSING THE EFFECTIVENESS OF OUR PROTOTYPE

Figure 3.14 *Site photo of Spaç. Courtesy of CHwB.*

To best explore the potential of digital reconstruction, we had to evaluate the prototype by introducing it to users. This section will start by outlining a pair of well-researched study tools that we combined to do this. It will then detail how we created a survey which measures both the usability of software and the impact of a presentation of memory. This section concludes with a brief explanation of how we approached interpreting the results of our survey.

Tools for Evaluating a Digital Reconstruction

To assess the effectiveness of our prototype digital reconstruction, our team used two measuring tools, the **User Engagement Scale (UES)** and the **Framework** (O'Brien & Toms, 2009) (National Science Foundation, 2005). The UES is a survey-based measurement system that O'Brien and Toms developed in 2009 to measure user engagement in digital interactions (O'Brien & Toms, 2009). The UES uses a self-reporting survey system that asks users to rate statements associated with various factors of engagement on a **likert** scale (Wiebea, 2013) (O'Brien & Toms, 2009). Lower values indicate disagreement with a statement, and higher values indicate agreement. Averaging these likert ratings from a random sample of users indicates the overall level of engagement they experienced in the context of each measurement component. Studies of the UES suggest that the factors of engagement considered for a particular form of digital media should suit that media (Wiebea, 2013).

In our implementation of the UES we used the Framework as a supplement. The National Science

Foundation developed the Framework to evaluate museum exhibits and measure the emotions felt by viewers interacting with the exhibits (Teller, 2007). Users rate short statements on a likert scale similar to that of the UES and then give the exhibit an overall score after reviewing and solidifying their ratings (National Science Foundation, 2005). A large part of the procedure for the Framework is asking participants to discuss why they rated each statement as they did (Teller, 2007). By using this concept from the Framework as part of the UES, we assessed the engagement of the users, as well as their felt emotional impact.

Creating a Survey to Measure Impact and Engagement

We created a survey that combined questions from both the UES and the Framework to measure the success of our prototype digital reconstruction. The survey questions are listed in Appendix B. The survey collected anonymous data and demographic information relating to the nationality and age of respondents. Since we designed the prototype to transmit memories from the Albanian communist era, we were particularly interested in getting responses from adult Albanians born after the fall of communism. We consider Albanians aged 18-28 our target audience.

For the UES based questions, we tried to evaluate **perceived usability**, **aesthetics**, and **satisfaction**. Our team developed statements relating to each of these categories to use in our survey. We chose perceived usability because it describes a user's emotional experience while interacting with a form of digital media. We measured aesthetics because of its impact on perceived usability and its critical role in driving curiosity. The last category, satisfaction, we used to encompass several broader categories of user engagement. These categories include **endurability**, **novelty**, and felt **involvement**. We also asked open response questions adapted from the Framework procedure intended to capture the emotions users felt while interacting with the model. Our survey also gave respondents the opportunity to share what key location they felt connected to and whether any specific story resonated with them. This helped us understand why users rated the statements the way they did. Finally, we asked respondents if they would want to visit Spaç.

We included a link to the survey in an email along with a link to the prototype digital reconstruction. The email provided instructions to interact with it before completing a post survey. We included a disclaimer about our project's use of the survey responses. Appendix B contains the text of this email and the survey questions. Zoto shared this email with students in one of his classes at the University of Tirana. Our team distributed the survey to the CHwB staff and other contacts provided by Professor Hersh.

Analyzing Survey Results

To analyze our UES data we calculated means and variances of responses to each statement. We also calculated category scores by taking the average rating of all the statements for the category. Higher average ratings for positive statements and lower average ratings for negative statements indicate greater user engagement. As a result, we used the results on a statement-by-statement basis as recorded, with 4 indicating higher agreement. Since only our perceived usability questions took a negative form, that was the only category where lower ratings indicated greater user engagement. We calculated this category from the inverse of the score, i.e. 4 indicated highest disagreement.

For the open response questions, we sought to find patterns between respondents. We noted when multiple users reported the same emotion, or similar emotions, like happiness vs. gladness. To identify patterns in responses about stories and locations, we counted the number of respondents who mentioned each story and location. Finally, we counted the number of respondents who indicated they would like to visit the site, would not like to visit the site, or provided an ambiguous answer.

Figure 4.1 *Main 3D display.*

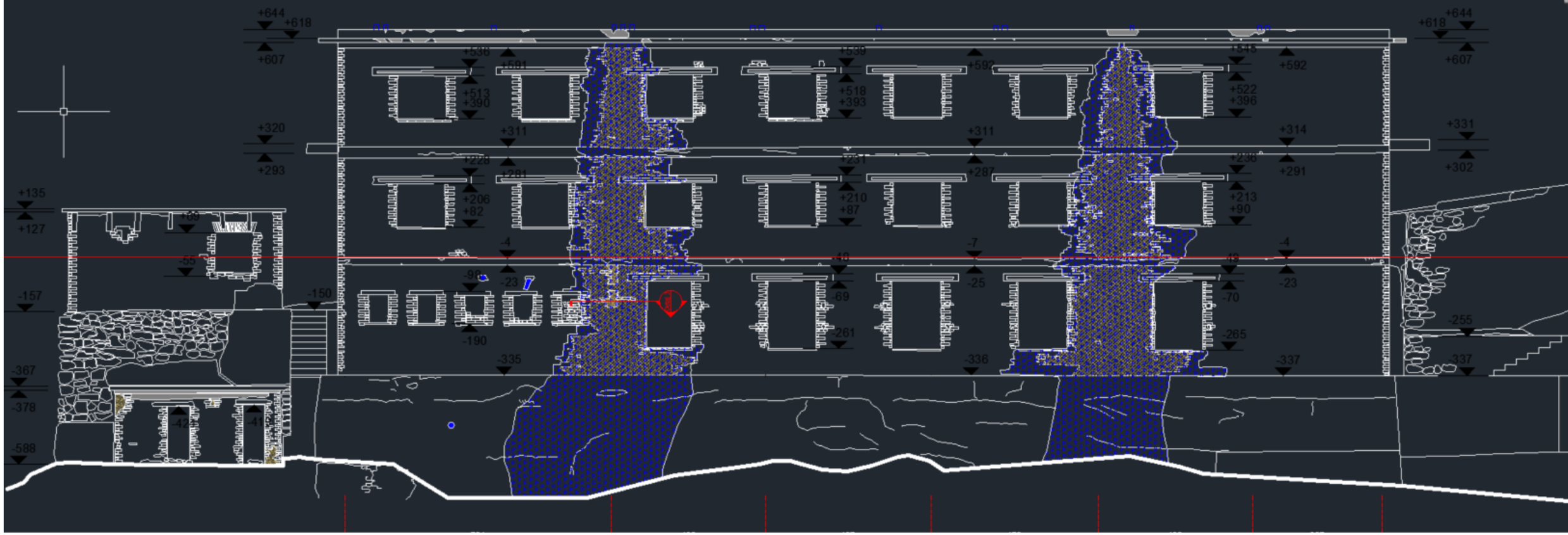


Figure 4.2 *Architectural plan of Kommendant facade. Courtesy of CHwB.*

DESIGN CONSIDERATIONS

This chapter explains the elements of our prototype **digital reconstruction**, as well as the design choices we made. We used a wide variety of tools, from **CAD** software to web development. This chapter uses a handful of terms that a reader unfamiliar with these technologies may not know. We provide all bolded terms in the glossary on page 64. Given that our goal was to make a prototype, we had to prioritize techniques that were feasible to explore with the time and resources we had. We could not hope to model the entirety of Spaç Prison, nor the complexity of how it developed over its three decades of use. We prioritized modeling parts of the prison which we could meaningfully represent, so we would have a workable prototype for testing.

We did, however, realize that we were starting a project that could be much broader in scope. As a result, we designed our model with the eventual completion of digital reconstruction in mind. The underlying technology needed to empower a future team to expand our prototype to cover a wider area, include more testimony, and increase the detail of the presentation.

In this chapter, we will provide an outline of the design work we did on the prototype. We will also explore what motivated our decisions. Particularly, aesthetic concerns, prior digital reconstructions, and the effective anchoring and transmission of memory informed our design.

3D MODELING

Our prototype is a preliminary digital reconstruction of the Spaç Prison. Since the Spaç Prison was a multi-building compound, the prison includes both the buildings where prisoners lived and the outdoor areas between them. A complete digital reconstruction would include every building, standing or destroyed, that prisoners or guards used. It would also include all outdoor areas within the Spaç Compound. For a complete overview of the site, see Appendix A, which details the standing buildings of the prison compound and includes a contour map of the terrain surrounding them. This section outlines what we modeled, and how we modeled it.

Modeling Existing Buildings

We modeled the core prison buildings. These buildings were the kommendant, commissary, multi-purpose building, the guard tower, and family meeting room. Appendix A outlines these locations. We prioritized these buildings for our prototype for a few reasons. Firstly, these were the buildings prisoners interacted with on a daily basis; where they ate, slept, and saw their families. Secondly, CHwB had detailed architectural plans for us to reference. Thirdly, we had physical access to these buildings, so we were able to photograph them. This made it possible to present these particular buildings through a variety of techniques.

The goal was to create building models that matched visually to the site and to archival photos. The digitally modeled buildings needed to be visual representations of the buildings. The prototype uses them to display the prison, not for engineering analysis.

The architectural plans we referenced for creating the buildings are from an AutoCAD file provided by our sponsor. We then completed **3D modeling** work that took place in Solidworks. We used Solidworks internal stereolithography (**STL**) file saver tool to save the buildings in the STL file format. Figure 4.3 shows the file during each phase of this process.

To complete the 3D modeling, the team utilized multiple methods. The first method was to model each room from CHwB's architectural plans. This method has the benefit of matching the dimensions of the plans exactly, as every dimension of the room matched a line in the drawing. This phase of the implementation was also the slowest. Using this method, we modeled the first floor of the main prison cell block. With each room taking close to two hours, we chose to explore new techniques.

We addressed this by finding patterns within the architecture of the building. Repetition within the prison allowed us to model only unique rooms. Once we modeled the unique rooms, we combined copies of identical rooms to model entire buildings. This allowed for a faster completion of the model at the cost of accuracy to individual rooms. This lead to the completion of the main cell block building. The Auschwitz digital reconstruction's technique of presenting only one instance of identical buildings inspired this choice.

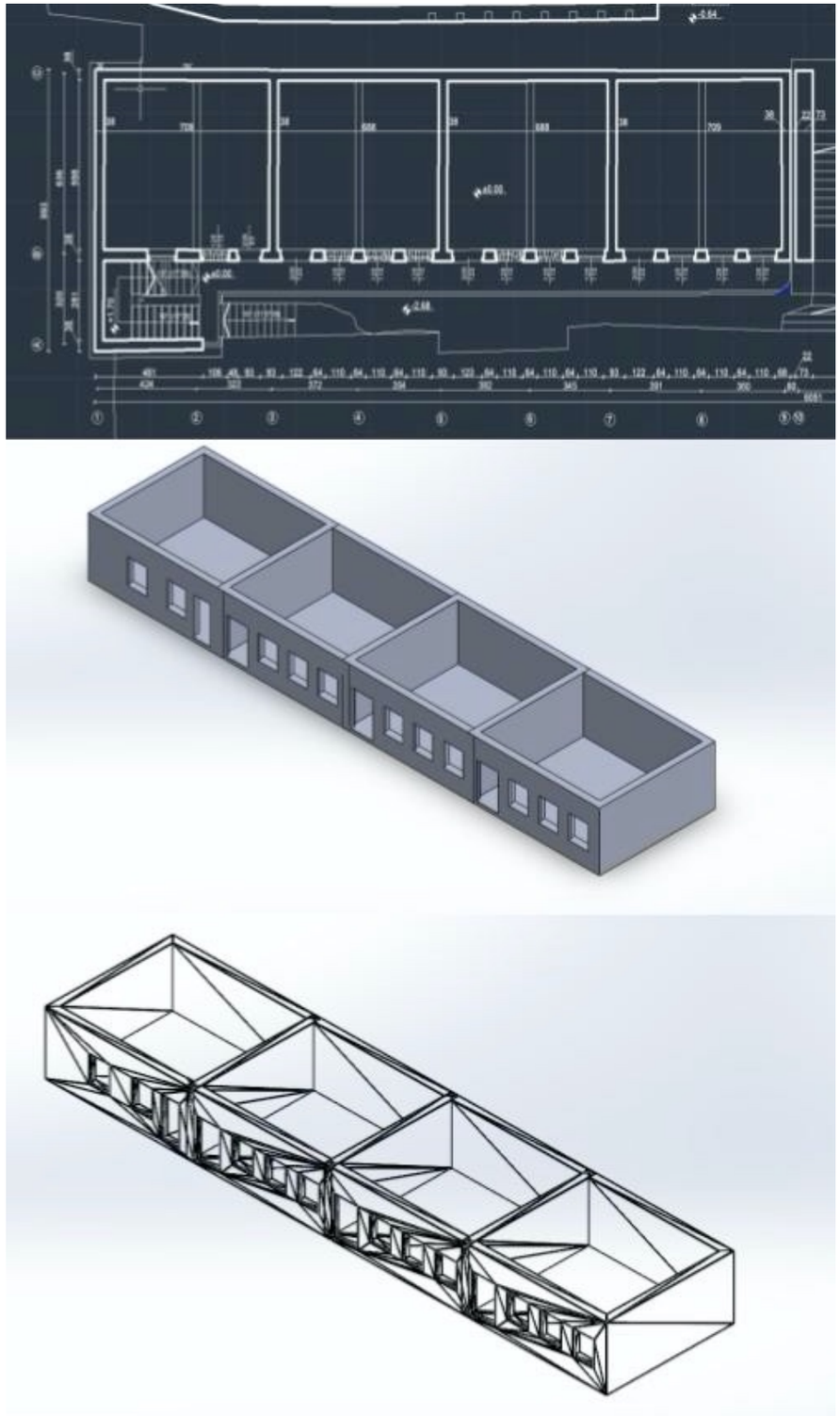


Figure 4.3 *Details the process of digital reconstruction. From top to bottom: the architectural plan (courtesy of CHwB), the created solid, and the generated STL file.*

To further accelerate the task we began using reference photographs. By importing a screenshot of the architectural plans of buildings into Solidworks, it became possible to trace all the lines from the plans. With this technique, our prototype model included all the other standing buildings listed in Appendix A.

Because the rollcall platform is no longer standing, it is much more difficult to tie memories of it to the physical location. Drangu's testimony of the rollcall platform described the harsh treatment and significance of the location to his time at Spaç. Drangu described the verbal abuse prisoners endured. He further described the extralegal lengths of time the guards made them wait, exposed to the elements. Kati also suggested, as it was an important part of daily life in Spaç, that we represent this area. Drangu's powerful testimony and Kati's recommendation inspired us to reconstruct the rollcall platform. We did this to make it possible to anchor Drangu's testimony to a physical location in the model.

Modeling a Destroyed Building

Since there are no records of the architectural plans for the destroyed rollcall platform, a team member referenced old photographs and a survey of the ruins. Our implementation included estimating the dimensions based upon the apparent size of the platform compared to the surviving buildings in the photographs. Figure 4.4 shows the reference photo used and the digitally reconstructed model.

To model the entire site, we had to place the buildings on a background representing the terrain in and around the Spaç Prison. The original implementation of this terrain used an aerial photograph of the site, like the Saydnaya model. This two-dimensional representation of the terrain failed to capture the sense of place. For

Figure 4.4 Reference photo (provided by CHwB) and resulting digital reconstruction

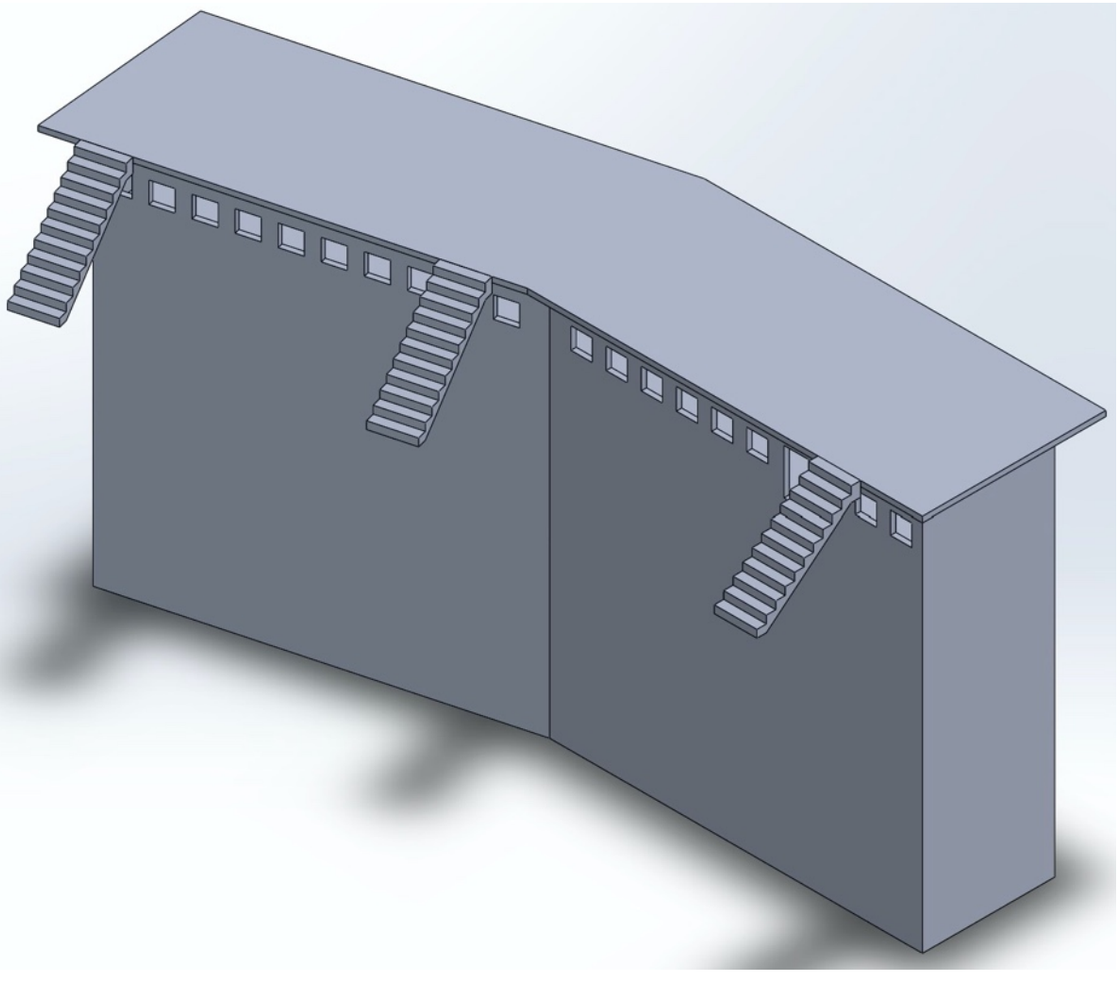
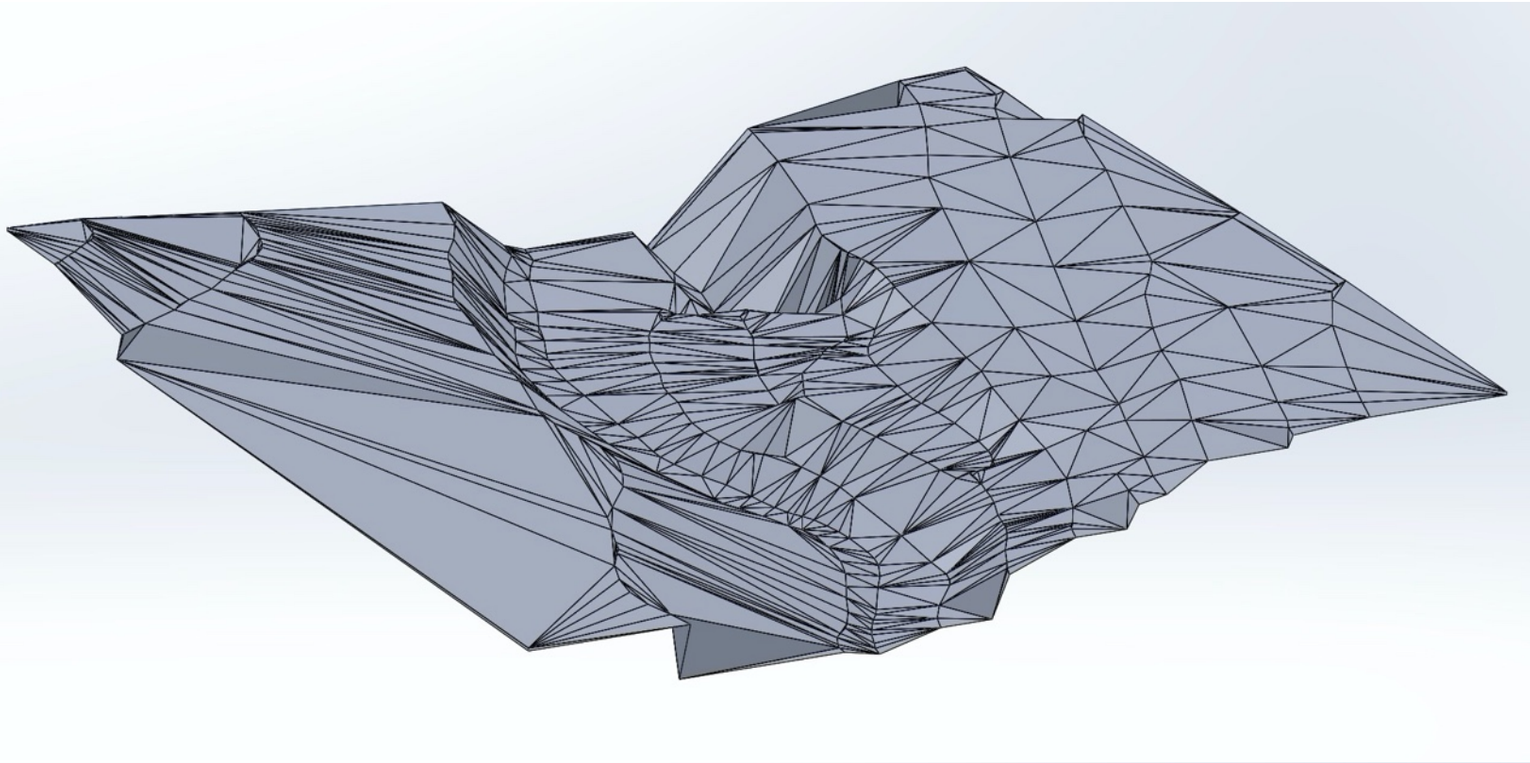


Figure 4.5 *Version 1 of the terrain model.*



example, buildings which were shorter in height, but stood higher on the hill, looked wrong when displayed on a flat surface. This visible inaccuracy prompted the team to create a three-dimensional representation of the terrain of Spaç.

Modeling Terrain

To begin creating the new terrain, this reconstruction process referenced old military maps. Using **SketchUp** as our terrain modeling tool, the team created Version 1 (figure 4.5) of the terrain model. This first version did not meet our visual expectations of the Spaç site. Notably, the lack of depth in the valley, and the overall rough appearance of the terrain made it unusable.

Subsequent versions moved away from using the old survey maps as a reference for terrain elevation. Instead, the implementation involved using a script to overlay elevation data from a Google service over our map. We proceeded to create another model from this improved model. Versions 2 and 3 of our model of Spaç's terrain used SketchUp but the output STL file is solid, for ease of viewing in the main 3D display. Figure 4.6 shows terrain Version 2.

Version 3, the final version created in SketchUp, still suffered from a rough appearance and overall lack of visual appeal when viewed in the main 3D display. Figure 4.7 displays Version 3 of the Spaç terrain. This prompted the team to try using the 3D artist's tool **Blender**. Blender has features like vertex smoothing

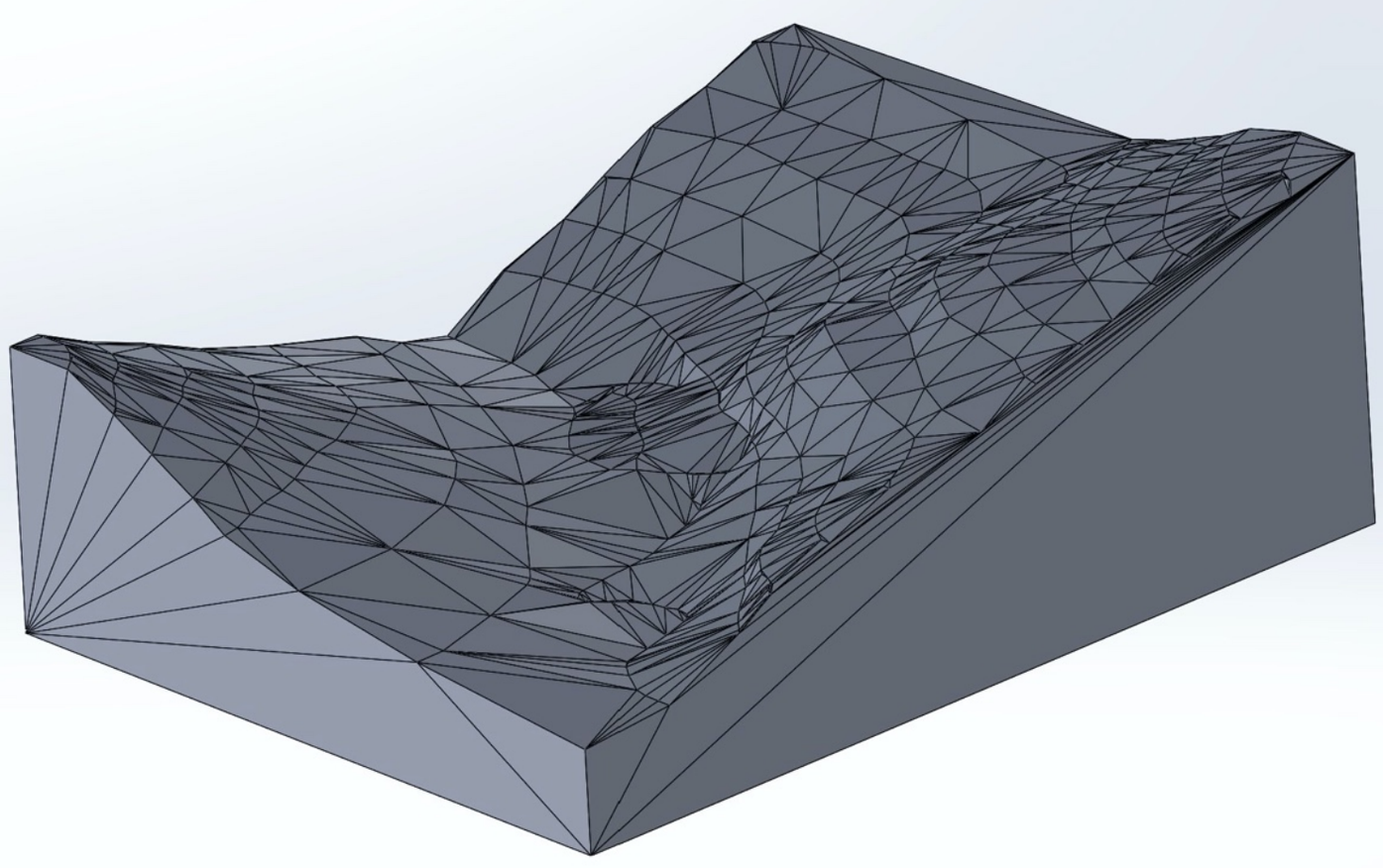


Figure 4.6 *Version 2 of the terrain model.*

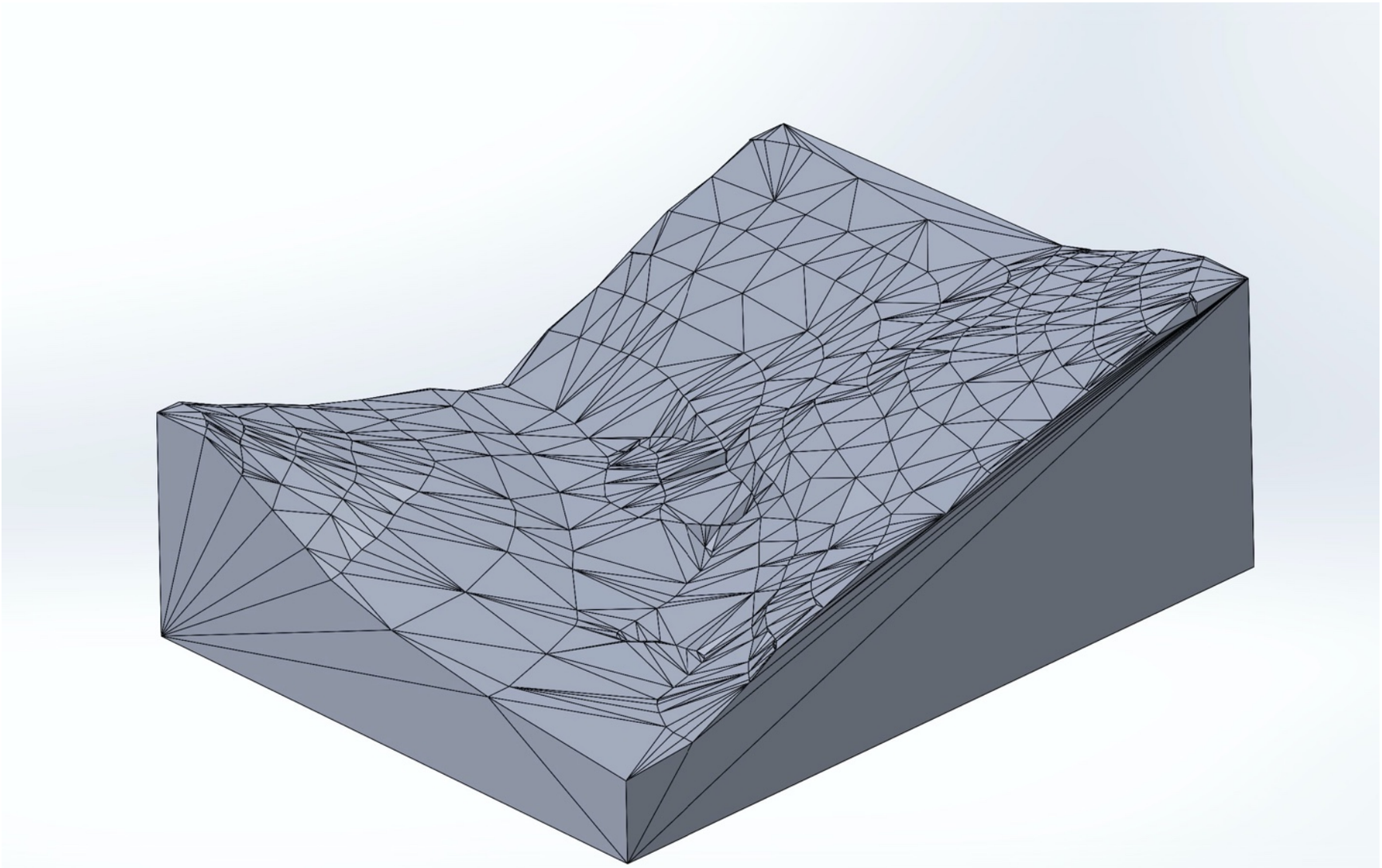


Figure 4.7 *Version 3 of the terrain model.*

and 3D sculpting. Blender can easily increase the level of detail of the 3D model, giving the appearance of greater detail when we display the terrain.

Immediately upon switching to Blender, the team increased the level of detail of the terrain model and applied a smoothing tool. This made it less obvious that the terrain comprised hard geometric lines. Additionally, we edited the valley using a new scheme,

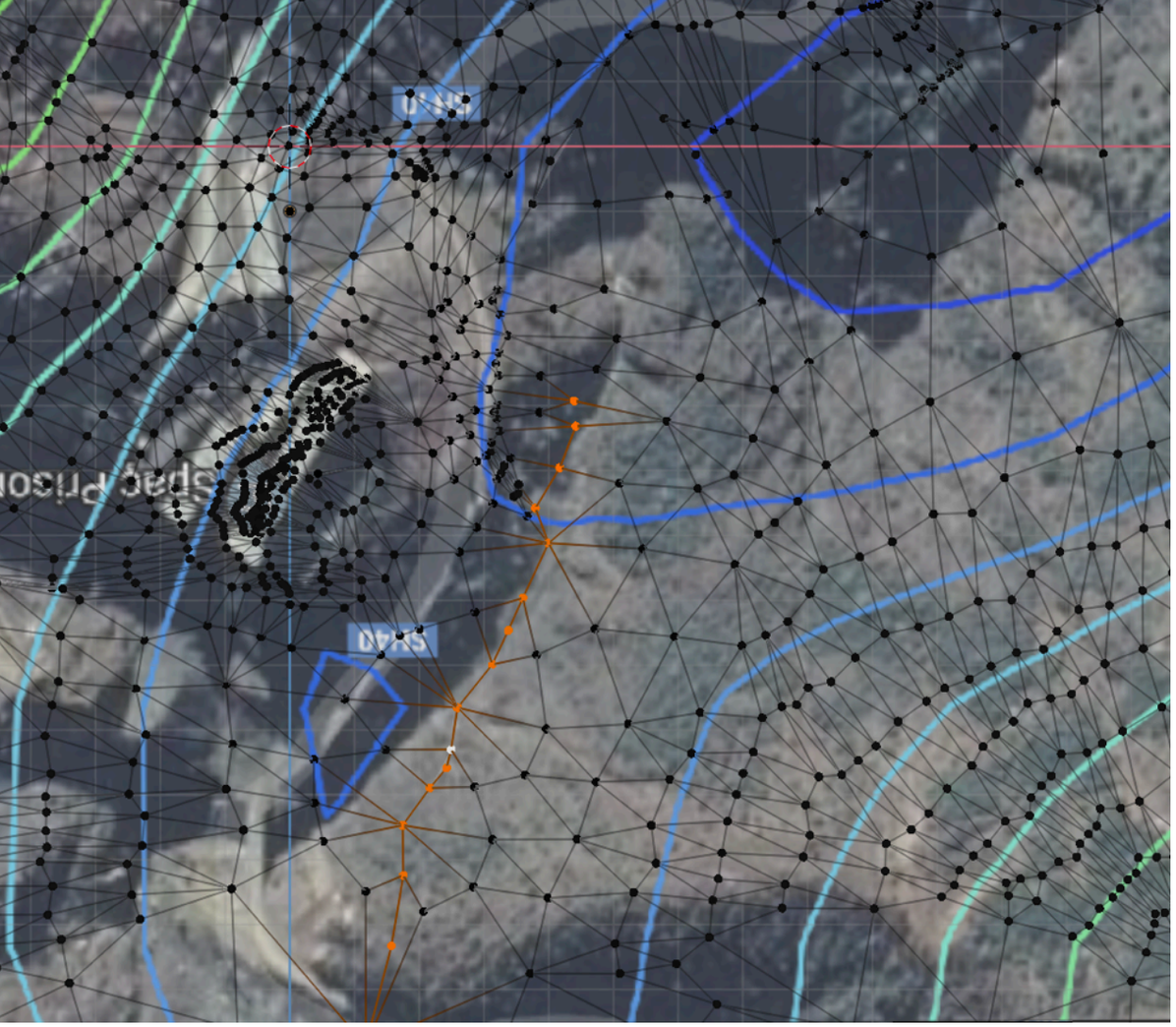


Figure 4.8 Screenshot from Blender, showing vertices and lines as well as imported contour lines.

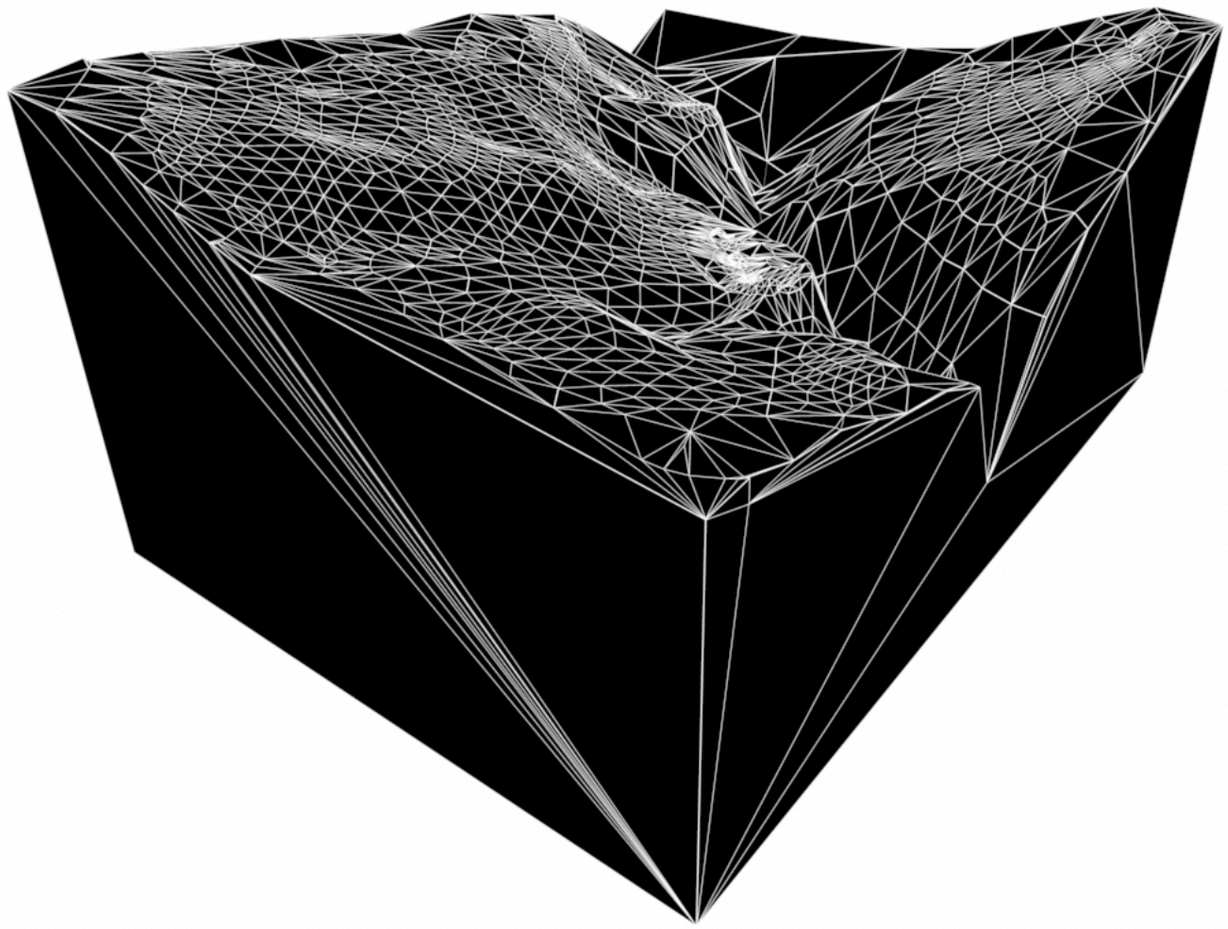


Figure 4.9 Version 4 of the terrain model made in Blender.

taking minor artistic license. By using a reference photo, one member was able to sculpt the valley near Spaç to resemble its actual appearance, rather than simply trace the imported **contour lines** (see figure 4.8). This involved manipulating certain parts of the valley vertex-by-vertex, or line-by-line. Version 4 of the Spaç terrain model reflects these changes with a much deeper valley. A team member was also able to adjust the terrain to match certain human-caused changes in elevation, such as a sharp drop-off behind the main cell block. Version 4 is the current version used in the prototype and is shown in figure 4.9.

Spaç Prison

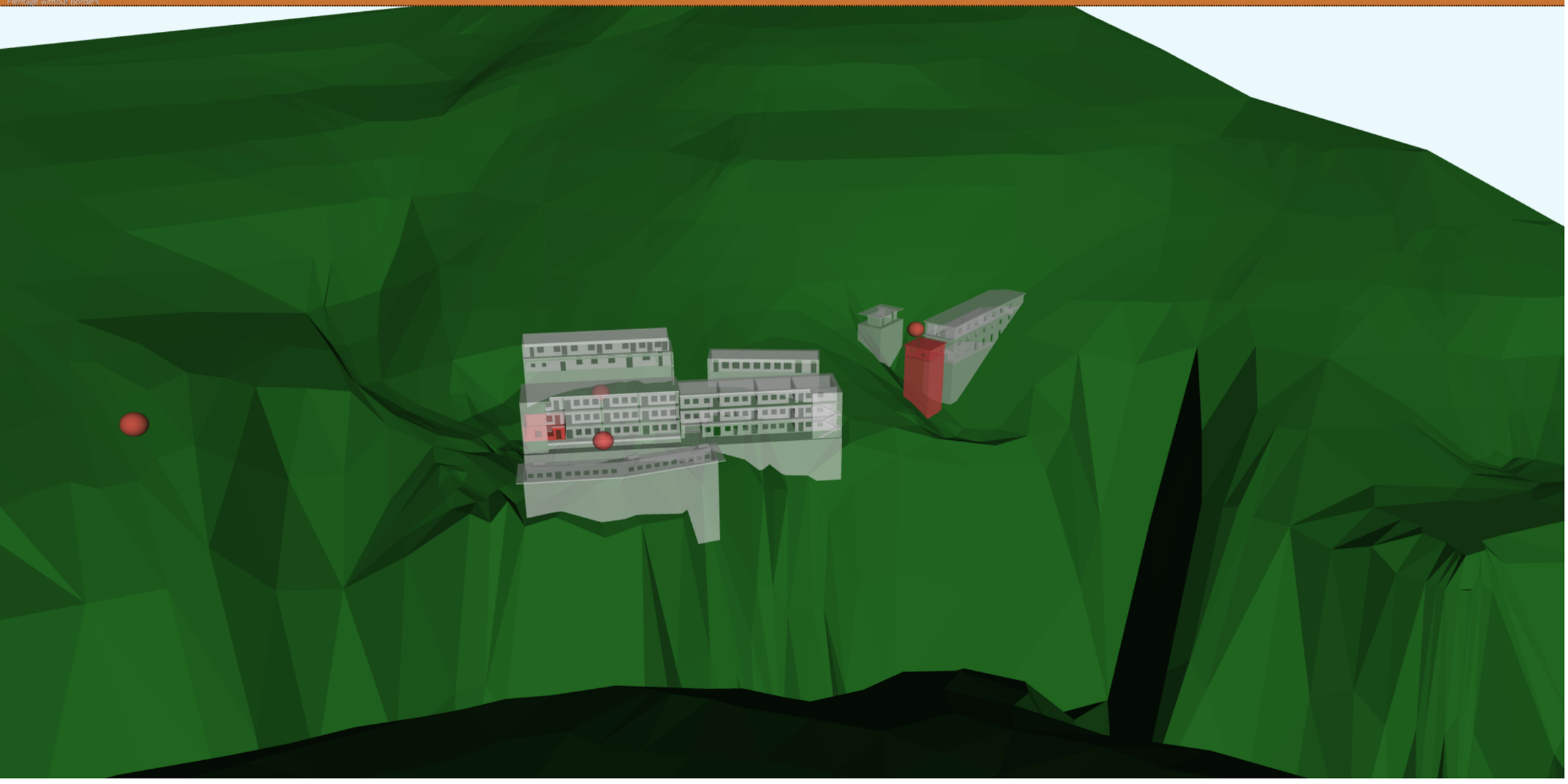


Figure 4.10: *Main 3D display.*

MAIN DISPLAY

In addition to modeling, a core objective of our prototype, in exploring digital reconstruction, was to present models, testimony and other media. To do this, our team decided to create a website. Both Saydnaya and Auschwitz were on the **World Wide Web**. This made them publicly accessible. It also encouraged us to explore Web compatible technologies like **hypertext** and **Javascript**.

Our website's 3D display featured the core buildings and Version 4 of the terrain model. We chose **Three.js**, a JavaScript **library**, to control the display of the 3D models. Three.js allowed the team to make decisions concerning **aesthetics** such as: the color of the buildings; the transparency of the buildings; and the control scheme for rotating the display. We used Three.js on the **homepage** of the website (see figure 4.10) to create the 3D display.

Our goal was to make an aesthetically pleasing model. We emulated the aesthetics Forensic Architecture used in their Saydnaya digital reconstruction. Saydnaya's default setting displays the buildings as transparent, which enables the user to see the individual rooms in

Figure 4.11 *The main 3D display with the buildings fully opaque.*

the prison. We chose the same strategy. This provides the user with the ability to see both the internal and external shape of the buildings. Figure 4.11 shows the main cell block fully opaque. It is impossible to make out the depth of the cells. Figure 4.12 shows how, when opacity is lower, the back and side walls of the cell become visible.

We used Three.js orbit controls to enable the user to rotate the model in space. Saydnaya, which attempts to show the scenery around the detention center, and the shape of the building, enables the user to rotate the model. Since one design goal was to let the user see not only the buildings but also the landscape, we chose the same approach.

To load the 3D models, we used the standard Three.js library **STLLoader**. The STLLoader enabled us to import 3D models from any major CAD software and the ability to combine the terrain with the models of individual buildings, even though we created them with different tools. This choice was necessary to support the prior design decisions involving modeling the buildings and terrain.

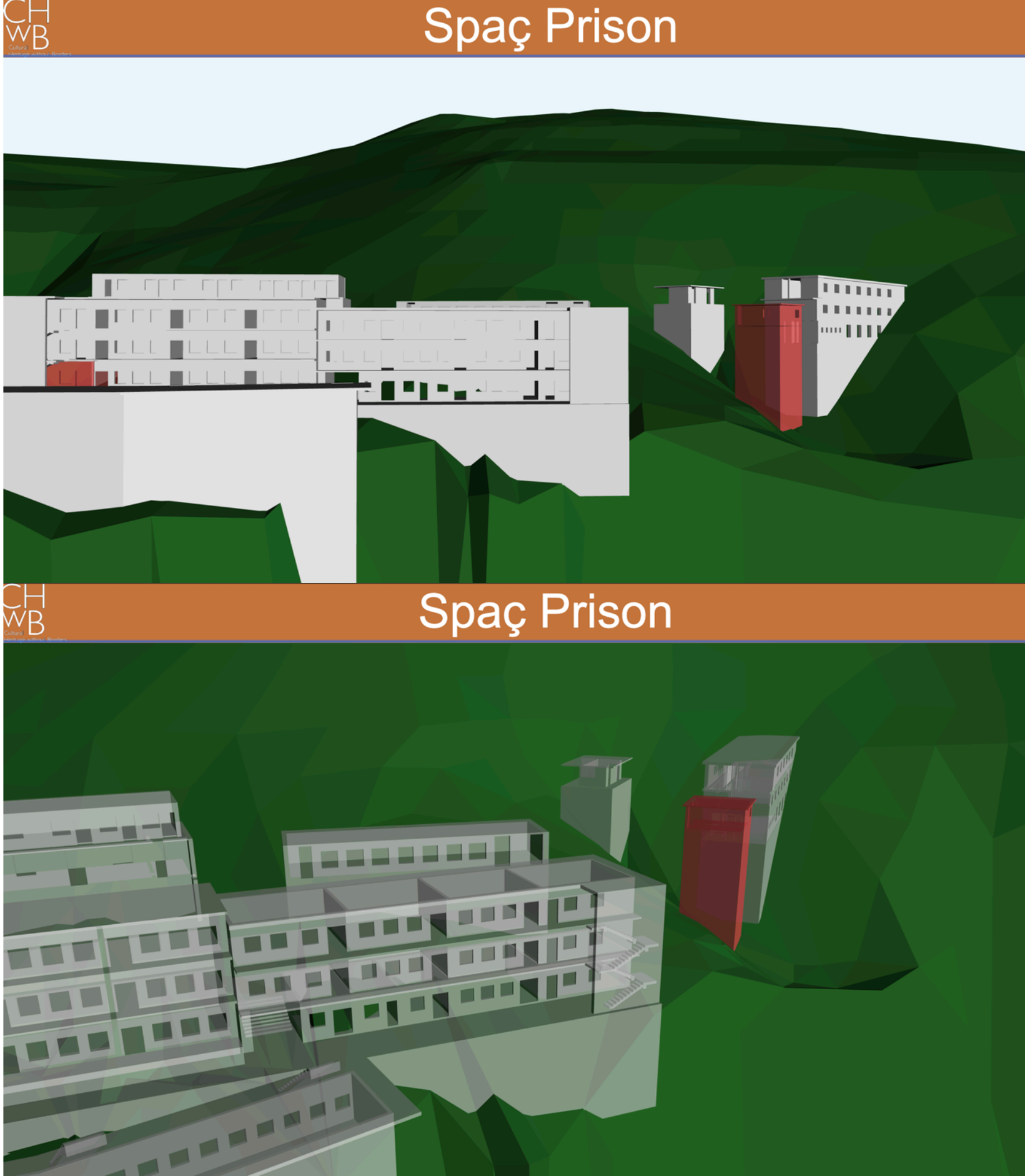


Figure 4.12 *The main 3D display with the buildings 40% transparent.*

Three.js made it possible to change all elements of the aesthetic display of the buildings and terrain model. We made the terrain model appear fully opaque, so it would serve as a solid background for the transparent buildings.

We had specific testimony concerning certain rooms in the prison. To better anchor these memories in the places they occurred, we emphasized these locations. For example, when Drangu described how 54 prisoners lived in a cell (see figure 4.13), he was specifically speaking about the cell he used to occupy. We highlighted important rooms like Drangu's in a bright red color, to draw attention to them. Our design also permitted users to click on these rooms, and see a page providing context, images, and testimony.

Drangu's testimony communicated how much life for the prisoners took place in the outdoor areas of Spaç Prison. To signify the importance of these spaces, we added red spheres to the model. These spheres draw attention to outdoor spaces in the same way the red coloring draws attention to important indoor spaces. This was a novel technique; our goal was to apply Sayndya's techniques for encouraging users to explore indoor spaces to the outdoor areas of Spaç Prison.

In the interest of time, we did not communicate within the software that users could rotate the model, nor that they could click red objects to learn more. Instead, we distributed the prototype with instructions, telling the users about the control scheme.

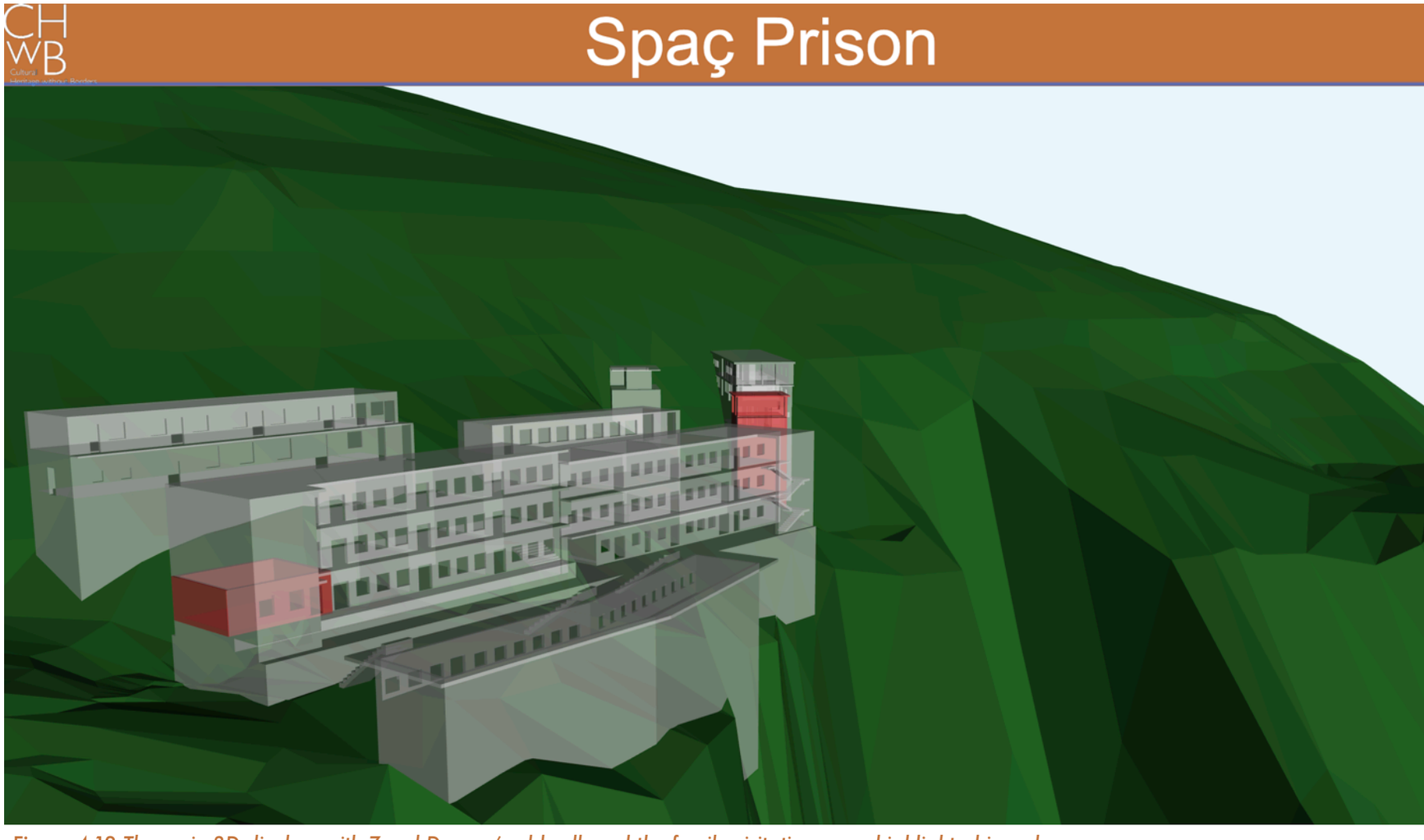


Figure 4.13 *The main 3D display, with Zenel Drangu's old cell, and the family visitation room highlighted in red.*

PAGE DESIGN

Throughout the page design process, we referred repeatedly back to the Forensic Architecture model of Saydnaya Prison. Since our objectives were similar to the Saydnaya model's, our initial design paralleled Forensic Architecture's design philosophy.

One of our first priorities was to make a consistent header that would make the site cohesive. Since our sponsor provided translation help and the necessary background materials to make the model, we decided to use their logo and color for the header. A black "Go Back" button appears at the upper right-hand corner of every page (see Figure 4.14), except the homepage, so the user can always return to the main 3D display.

Our site visits yielded a substantial number of **360 degree photographs** from parts of the prison that were relevant to the stories the project collected. This prompted us to focus on their display. We designed a

Figure 4.14 *A page showing just a 360 photograph of the rollcall platform.*

basic page layout around the 360 degree photo viewer Panellum. Since the Saydnaya website created an immersive experience by having their 360 degree display take up the whole screen, our implementation employed **Pannellum** to emulate this (see Figure 4.14). With this implemented, the prototype contained 360 photographs connected by a header, and through the main 3D display. We refer to pages of this type as **360-Photo Pages.**

We wanted to include stories in our prototype. Because most of these stories took place in or described specific rooms or outdoor areas of the prison, it was necessary to create a tool that combines text and 360 photographs. Based upon Forensic Architecture's design, a standard feature of our prototype digital reconstruction was to have the stories as scrollable text, as shown in figure 4.15. We made the scrollbar appear only if there is too much text to display on a single page. This permits stories or descriptions of any length

Figure 4.15 *The rollcall platform 360-photo page featuring a story.*

Fig 4.16 *A 360-photo page featuring a story and hotspots.*

to only take up one-third of the screen, like in the Saydnaya model. In this way, we associated testimony and place.

Hotspots, another Panellum feature, are links to different pages which appear in the 360-Photo Page. This feature provides an effect where the link stays in the same place as the user rotates the image. This visually associates a link with specific objects or places within the display. Hence, using hotspots in our design provides a particularly useful mechanism to connect important details which a user might not know to a physical location in Spaç prison, (see figure 4.16). This allows us to anchor testimony to specific places, even within a room or small area of the prison.

Using hotspots provided us with an important opportunity. When a user places their cursor over a hotspot, text appears describing the connected page. In writing up descriptions for each hotspot, we based our

Propaganda

This goal of dehumanizing prisoners was very clear in the propaganda because outside they were trumpeting that in places like Spaç or internment camps they would put men who didn't have any of the values of the "new" man that Communism wanted to build. Therefore they were not only isolated but also helping to build a better country by working as slaves. That was something very hard for them to endure here. They were working here but their contribution was not recognized by anyone inside or outside of the prison.

The philosophy of the slogans that you can see here and there. So, yeah, these are sayings in relation to the values of Marxism. Quotes form the dictator were supposedly sentences and phrases that would help the prisoner's rehabilitation.

The quote on the left said "By stealing, evildoers attack our regime and our Economic Socialist base." It is attributed to Enver Hoxha.

Figure 4.17 *A Two-Photo Page detailing propaganda linked to from the rollcall platform in Spaç. On the left is a quote over a cell door. On the right is a picture by the gate.*

design decisions upon the Saydnaya model. In their model, links to video commentaries or other stories contained emotional quotations, such as "Fear Starts in the Afternoon." For our prototype, we attempted to match their intense tone. For example, we labeled a page describing the inner entrance gate to Spaç "The Small Gate to Hell." This quotation comes from the Albanian poet and former prisoner of Spaç, Maks Velo.

We wanted to include pages in the prototype digital reconstruction that did not have 360 photographs. To accomplish this, we created a new page layout called a **Two-Photo Page**. These pages show two vertical images and a third column for text. This layout accommodates our large number of portrait photographs. The Two-Photo Page detailing the propaganda can be seen in figure 4.17.

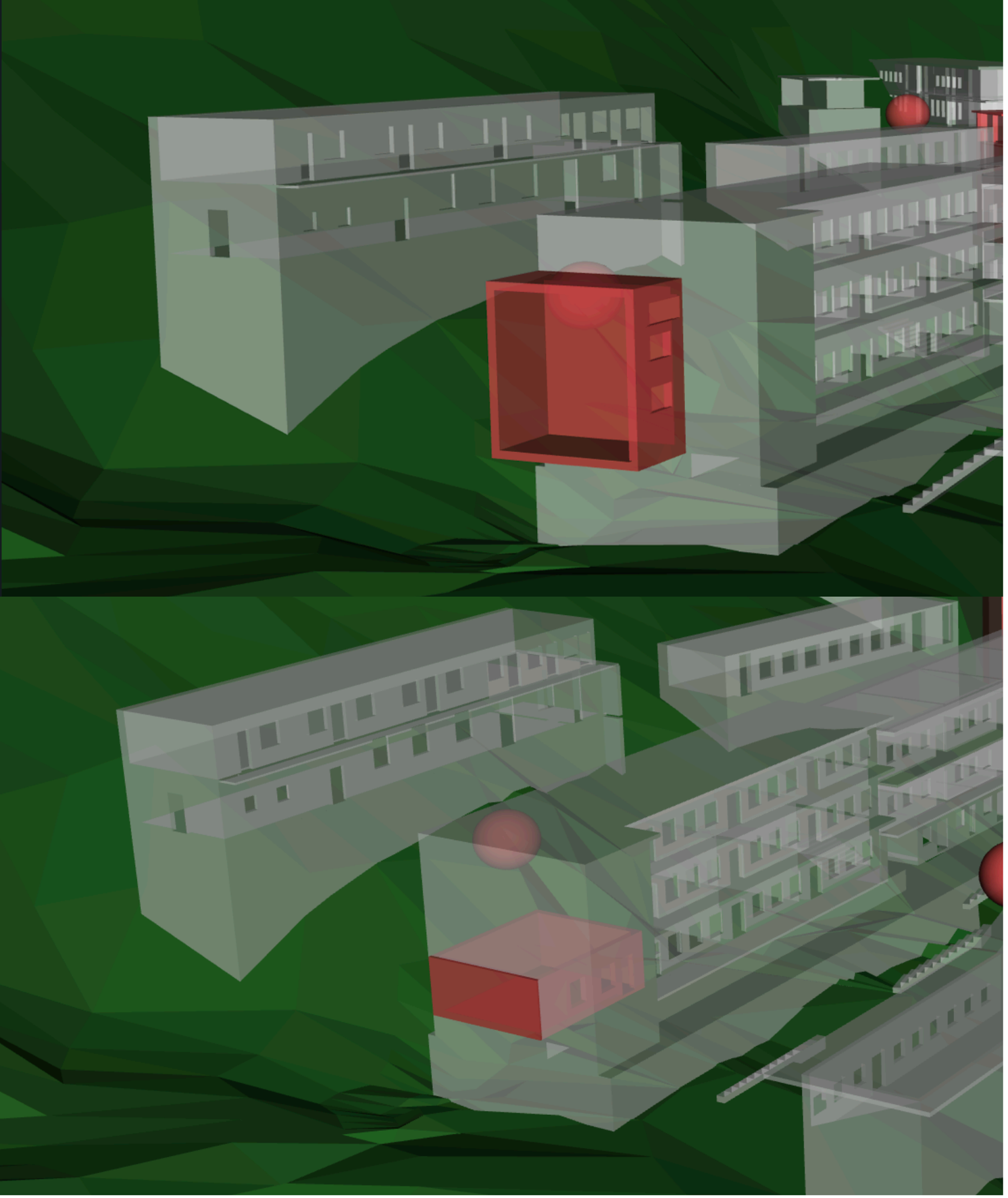


Figure 4.18 *The main 3D display with Zenel Drangu's old cell in misalignment.*

EXTENSIBLE WEB DESIGN

CHwB does not have technical staff like web designers or programmers. We decided to structure the website around a pair of JSON (JavaScript Object Notation) files. These files are text files that specify the data included in the website. Editing JSON files involves specifying data; it does not involve computer programming.

A lot of work goes into specifying what appears in the 3D display. For example, when a developer first specifies a new CAD model to add to the digital reconstruction, the STLLoader loads it however it is oriented in the original file. For example, figure 4.18 shows the 3D display with Drangu's cell before it has been properly oriented. In that figure, the cell does not align with the rest of the building, and appears misaligned, floating in mid-air. Figure 4.19 shows what the 3D display looks like after the developer edits the JSON file; the cell is properly aligned.

In this way, a user can specify all the components of the model. From 360-Photo pages to new buildings to different colors for the terrain, we've enabled the expansion of the model without the need of a trained software engineer.

Figure 4.19 *The main 3D display with the alignment of Zenel Drangu's cell fixed.*

DESIGN RESULTS

These were the techniques and considerations with which we made our prototype. We hoped to create a preliminary reconstruction that would further our understanding of what digital reconstruction could accomplish. Our prototype's design should allow it to serve as the basis for a more complete digital reconstruction. While the tools we used were technical, we tried to engage our design process with the issue of memory transmission in Albania.

Figure 4.20 *Clements at the Spaç Prison.*

Figure 5.1 *Archival comparison photo courtesy of CHwB.*

FINDINGS

This chapter outlines what we learned in our attempts to explore **digital reconstruction**. It starts by explaining two of the successes an existing museum in Tirana has had in reaching young Albanians. It then explores the ability of the Spaç Prison to elicit testimony from a former prisoner and anchor memories in place. The chapter then evaluates the ability of our limited prototype to do the same. Finally, the section looks at what happened when we put the prototype in the hands of users, providing a preliminary evaluation of the impact our techniques can have on the public.

5.2 Digital reconstruction prototype.

EXISTING HERITAGE WORK VALIDATES DIGITAL RECONSTRUCTION

We interviewed a staff member of the House of Leaves. The official told us how important educating the younger generation in Albania about communist history is to their organization. Although the focus is on school-age children who visit the museum in groups for weekly events, the museum official believed that digital representations of history would better reach a wide range of the younger generation. In their experience, the limited multimedia elements in the House of Leaves, like TV's playing old movies, resonated with youth. The museum contains video-recorded interviews and old television footage from Albania's communist era. They expressed that they wish the museum could explore more digital elements, but had not had the opportunity. This preliminary success and desire for more work helps validate our decision to explore digital reconstruction.

Additionally, they affirmed to us the power of historical places. The staff member thought "the building [was] the most important artifact" at the House of Leaves as its historical significance helps young people understand their heritage. This interview supports the idea that Spaç, as a place, can foster dialogue.

> **"The building is the most important artifact we have."**

SPAÇ PRISON ANCHORED DRANGU'S MEMORY

Our first former inmate interview with Zenel Drangu demonstrated how useful the Spaç Prison site was in both eliciting testimony, and anchoring it in space. We've outlined the stories he told, and the places that prompted him to tell them, to illustrate this relationship between memory and location. We also explore parts of his story that were prompted by ruins, or by the absence of the physical buildings where they took place.

Figure 5.3: *Drangu being interviewed onsite at Spaç inside the family meeting room.*

Place and Testimony

We conducted an onsite interview with Drangu (figure 5.3), a former inmate. The team wanted to learn about what happened at Spaç. Since we used specific rooms and areas of Spaç to trigger Drangu's memory, we were able to preserve the association between place and testimony. These associations we uncovered served as the basis for memory anchoring we performed in the prototype.

When Drangu stood in buildings and on ruins, and told us stories associated with what used to be, he had nearly endless testimony to provide. We actually had to end our interview in the interest of time. It was clear he had a great deal more he could say about the Spaç Prison. The location brought forth memories of how the site once was.

When we asked Drangu to describe his former cell, he both described the cell and told us a story of the tough times sleeping in the crowded room. He went around the room, pointing out where features used to be. Figure 5.4 shows that Drangu was able to indicate where he remembered individual beds. He emphasized the cramped conditions which allowed 54 individuals to sleep in the very room he was standing in. It was clear how tight the conditions were, because he communicated using the precise cell he lived in.

Figure 5.4: *Drangu pointing out bed layout and other features in his former cell.*

At the exercise area or volleyball pitch in the center of the prison, Drangu shared two stories. The first was a basic account of the function of the place, explaining how the prisoners were periodically allowed to exercise there. He also spoke about an assembly there, where a speaker argued that Albanians had the best quality of life in the world. The speaker, after finishing his speech, demanded that one of the prisoners ask a question. Despite promising that there would be a definitive answer to any questions asked and that there would be no consequences for asking a challenging question, the guards dragged away the prisoner and Drangu never heard from him again.

In the family meeting center, Drangu talked about the hardship of visitation. He explained just how difficult it would be for a family member to visit. He explained the importance of the food that families would bring, and the intense scrutiny of the guards. He also told a story about a dangerous visit his family made one winter. In this story, his mother and brother struggled to carry food for Drangu on the long walk up to the prison. Nobody would give them a ride up the hill. On their way back, a driver who had refused to help them up to Spaç offered them a ride back down. Drangu's brother, upset that the driver wouldn't help them earlier, refused the ride. On the way down, the truck crashed and fell into the ravine along the road to Spaç. While this story took place on the road up to the prison, it was the family meeting room that triggered this memory for Drangu.

Testimony Without Place

When we took Drangu to the ruined rollcall platform (see Figure 5.5) he shared some of the insults and cruelties of the guards. He explained that they forced the prisoners to stand, waiting for rollcall much longer than the regulations prescribed. In response to the hope of NATO invasion of Albania, the guards once berated the prisoners. The officers said that, were the United States and their allies to invade, the first order would be to execute all the prisoners kept at Spaç, so the guards could go and join the military on the front.

Some of Drangu's most powerful testimony came from the ruins of the isolation cell. An officer once told Drangu to remove both of his boots and stand on the ice, despite a regulation stating prisoners would only need to remove one boot at a time. Drangu resisted this command, and punched the guard who gave it. As a punishment, the guard confined Drangu to an isolation cell for 40 days. Drangu said the cell was only 1 meter by 1.5 meters, and occasionally, two prisoners would have to share the same one.

The isolation cells are no longer standing. All that remains is rubble. There are no architectural plans of the isolation cells and no available historical photographs. This makes digitally reconstructing the isolation cell a daunting task. Drangu was not able to provide us with information about the placement of windows or doors, the thickness of walls, or the overall appearance of the cells. Digital reconstruction cannot anchor memories in places which it cannot present. Until there is a way to present the isolation cell, it is difficult to anchor Drangu's story to them.

Figure 5.5: *Photo of the ruined rollcall platform.*

Figure 5.6: *Fabian Interacting with the Prototype Digital Reconstruction. Bllaci, Zoto, Clements, and Rajaniemi interviewing.*

"So the gate, first gate was **here**. Second gate was **here**. We landed here. The van came from **here**, the road **was like this**, and entered **here**. First gate were opened and then stopped **here**. We could come out of **here**. I forgot to tell you that we were tied on the ride we weren't like, free to move. So the place where they untied was when you got out of the van and they took off these handcuffs. And basically you entered **here** in this area."
-Fabian Kati

OUR PROTOTYPE TRIGGERED KATI'S MEMORY

Our interview, with Fabian Kati, another former inmate, demonstrated a significant property of our prototype digital reconstruction. The team handed him the prototype and gave him no instructions on how to use it. When Kati saw the prototype, he looked at the screen for a short period of time. He wasn't quite sure what to say. He asked, "What do you want to know?" After a team member demonstrated rotating the model, he took control of the mouse. Without further prompting, Kati began giving the team an outline of the physical buildings of the site.

Although the buildings in the model are not labeled, he slowly dragged his mouse over the buildings and explained what happened there. His 'tour' began with the entranceway to the main prison compound.

"So the gate, first gate was here. Second gate was here. We landed here. The van came from here, the road was like this, and entered here. First gate were opened and then stopped here. We could come out of here. I forgot to tell you that we were tied on the ride we weren't like, free to move. So the place where they untied was when you got out of the van and they took off these handcuffs. And basically you entered here in this area [emphasis added]."

Repeatedly throughout the interview, Fabian used the cursor to indicate specific parts of the model as shown in figure 5.6 and the quotation above. Fabian indicated locations within the model a total of 100 times. It is worth noting that the prototype model did not include a representation of the "first gate" or "second gate." He pointed out their precise locations based on the terrain and the relative position of the buildings. This

Figure *5.7 Ruins of the buildings where Fabian Kati lived.*

demonstrates that the model can anchor memories beyond those which we used to build it.

Furthermore, at certain moments while Fabian navigated through the model, as he pointed out specific digital images in the model, he remembered details which he did not share in the pre-model part of the interview, e.g. that he was tied when the van brought him to Spaç. This concretely demonstrates the capacity of the model for triggering memory. Fabian explicitly says that he “forgot” to tell us that the police had tied him up, until he saw the model. The prototype triggered a memory which he had forgotten.

Kati later focused his testimony on an area of the prison where there were no buildings. When he lived at Spaç, political prisoners had their own compound (see figure 5.7), and would sleep and go to rollcall there. Kati noted that the buildings he lived in were not included in the model. Using the terrain, Kati was able to communicate his memories of these places.

“Okay, so the bridge **went like this**. And to this part. And **here** was like this, 1, 2 barracks. And the canteen was **right there**. And on top it was the place where the special prisoners used to stay. And **here**, on the bottom, the hill, there was a very small place. **Here**, this place here, where the, the ending part maybe **here**. It was the isolation cells, **there**. And **here** was the place where, I told you, they used to tie people there. And then the path **went like,** because **here** was the gallery of the brigades that went to work. And the, the counting took place **here** for them, the shifts, you know, and they started walking to the valley from this side. **Here** it was some small buildings as well. It was, uhh, some animals they used to keep there, near the kitchen, maybe for the soldiers.”
-Fabian Kati

Once again, Kati used his mouse cursor to point out specific areas, and describe them. His cursor traced the shape of the “bridge” as he explained how it lead to the barracks he lived in. He also traced the path that the prisoners used to take up to the mine. Even though the prototype did not attempt to represent these destroyed buildings, he listed them, explained their purpose, and indicated their placement. The only reference to this area we provided was the terrain model. This suggests the terrain model could be a powerful memory elicitation tool in its own right. The terrain triggered Kati’s memories, and provided him an opportunity to anchor them in place.

Comparing the Interviews

The relationship between our interview on site at Spaç Prison and our interview with prototype present suggests that our model can serve some of the same functions as the Spaç Prison. There were many similarities between our interviews with Kati and Drangu, despite the differences in procedure. While Drangu lead the interviewers on foot through the former prison, telling stories about each place he walked through, Kati lead his interviewer with the mouse cursor, explaining things he pointed to. The parallels between their explanations show that the digital reconstruction can be useful as a memory elicitation and anchoring tool in the same way the site is.

SURVEY FINDINGS

The team received 24 survey responses. The demographic data we collected indicates that the users came mostly from our target audience of adult Albanians born after the fall of communism. Figure 5.8. shows that this audience (Albanians, 18-28) made up exactly ⅔ of all responses.

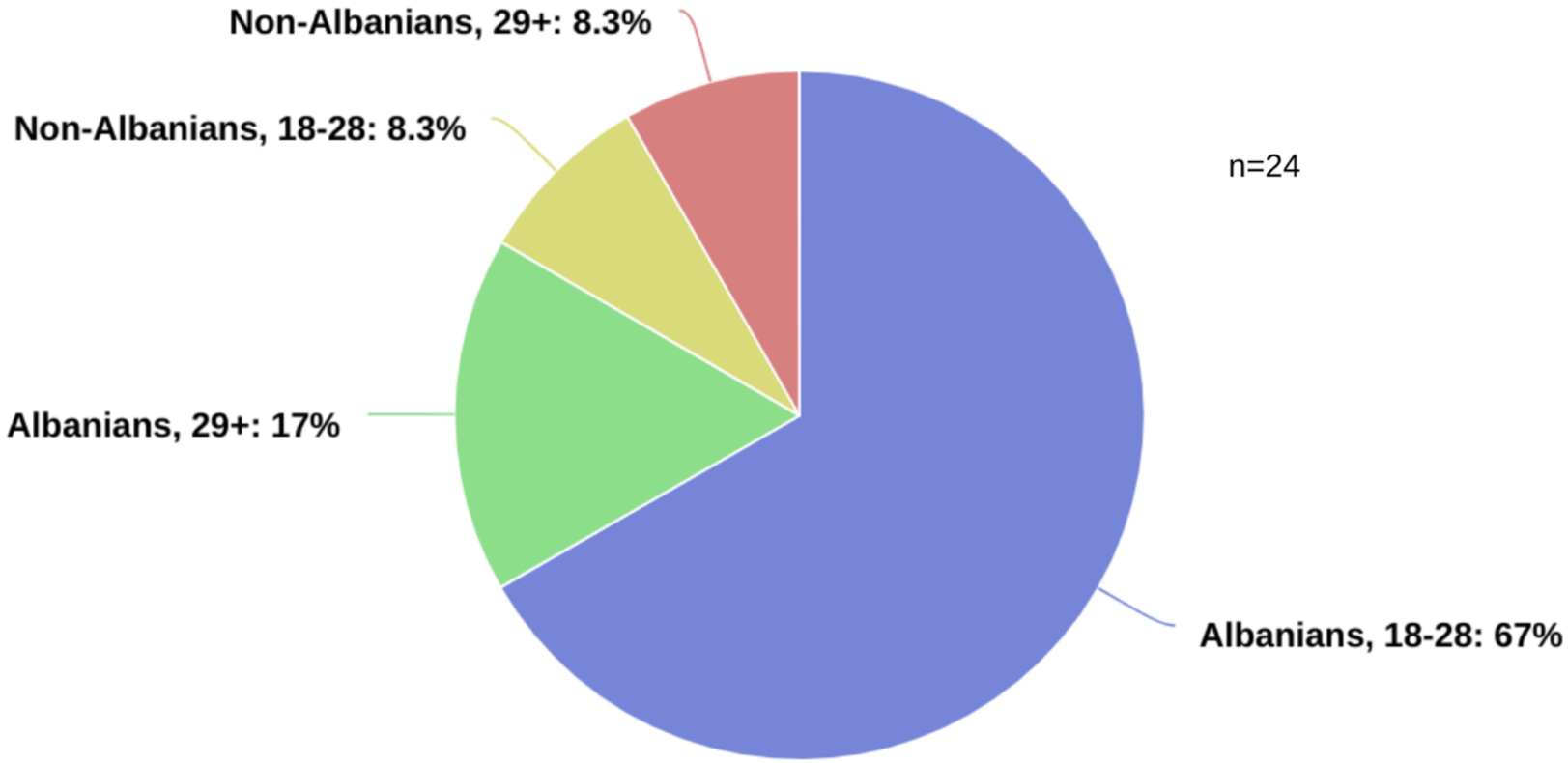


Figure 5.8 Graph showing respondent demographics broken down by nationality, location, and age.

Our Prototype Communicates and Triggers Memory

When we asked the respondents what stories or parts of the model most affected them, they mentioned one story the most. Six respondents (n=24) singled out the Winter Visitation page. This page was a **360-Photo Page** featuring a photograph of the family meeting room and Drangu's story about his family visiting one winter. The page displaying this is in figure 5.9. One user stated that this story "shows the true value of family." This indicates that the respondent was able to assign value to the story. This suggests that it communicated a memory well enough to provoke analysis.

One respondent said that the story reminded them of their own family's memories, saying they knew "some similar [stories] told by [their] grandfather's brother" who was imprisoned under communism. Another respondent said that the place that impacted them most in the prison was the family meeting room. They shared that their "mother's side of the family were all persecuted and both [their] grandparents spent time in prison[.]" These responses, one to the story, and another to the location, show that the prototype can

Users of Our Prototype were Interested in Spaç

trigger memories. The pages representing this area of the prison prompted users to share their family stories.

The survey (n=24) also tried to measure whether or not users were interested in visiting Spaç. While we did not perform a pre-survey, and could not quantify how much impact our model had on people's interest, we did find that respondents were interested in visiting. Eighty-three percent of respondents said that they would want to visit the site. One respondent explained that they would visit with the intention of "honoring those who suffered there[.]" Viejo-Rose (2015) suggests that the assignment of values to physical sites, like the Spaç Prison, is the result of the communication of memory. Thus, the respondent's belief that visiting the site would

Figure 5.9: Screenshot of family meeting area, with Drangu's story displayed to the left.

Our Prototype Is Engaging

be a way of "honoring those who suffered" indicates that they've received memory they associate with Spaç.

Engagement captures the emotional, behavioral, and cognitive connection that exists between users and digital media. We measured three well-documented factors of engagement; **aesthetics**, **satisfaction**, and **perceived usability**. Our survey results rate our prototype relatively highly in all three categories. We calculated category scores of 3.3 for aesthetics, 3.5 for satisfaction and 3.2 for perceived usability, with 4 being the most positive possible result and 1 being the most negative. Studies of digital media suggest that high ratings in these categories indicate our prototype successfully engages users and transmits information (O'Brien and Toms, 2008). Both category scores and statement ratings are provided in Table 5.1.

The category score for aesthetics was 3.3. Users expressed weak agreement with statements indicating the prototype had aesthetic appeal. Typically, high aesthetic appeal facilitates attentiveness and curiosity (Attfield et al, 2011). Of statements designed to measure aesthetic appeal, users agreed most that they "liked the graphics and visuals used in the website" with an average rating of 3.5, with 4 being strong agreement. This rating being the highest one suggests that the prototype's visuals promote curiosity and attentiveness (Attfield et al, 2011).

Satisfaction had a category score of 3.5. High satisfaction generally indicates **endurability** (Wiebea, 2013). An endurable interaction, in the sense we use here, means one that a user is likely to remember and recommend to others. Endurability is a necessary property for a digital reconstruction to transmit memory.

If users are likely to forget about their interaction, they have not really participated in a memory transmission. If the prototype is endurable, it is also more likely that users will recommend it to others. This property is interesting because recommendation necessitates communication. Since it is “the process [...] of communicating” that turns memory into heritage (Viejo-Rose, 2015 p. 4), users recommending the prototype to each other will serve the prototype well in facilitating heritage discourse.

We calculated a perceived usability category score of 3.2. This characterizes the users’ emotional experience navigating the website as mostly positive. The higher the user perceives the usability of the website to be, the more they will engage with it (Attfield et al, 2011). Users who are not engaged, or think digital media is not usable, are unlikely to continue their interaction (O’Brien & Toms, 2009). It is important that users spend time with a digital reconstruction, and complete their interaction.. If a user does not take the time to look at the visuals, read the stories, or explore the website, it will be impossible for them to receive memory and unlikely for them to become more interested in Spaç.

Overall, our survey suggested that our prototype is engaging to its target audience. The factors of engagement all have the potential to contribute to the effectiveness of a complete digital reconstruction. This reaffirms that digital reconstruction, and more specifically, the techniques we used in creating the prototype, can accomplish CHwB’s long term goal of generating interest in Spaç by transmitting memory. This suggests that the prototype can usefully serve as a basis for a complete digital reconstruction of Spaç.

Category	Statement	Mean	Var.
Aesthetics	The experience appealed to me visually	3.3	0.65
Aesthetics	I liked the graphics and visuals used in the website	3.5	0.43
Aesthetics	I liked the layout of media elements in the website	3.3	0.58
Aesthetics	The website was aesthetically appealing	3.3	0.65
Aesthetics	Score for category	3.3	0.58
Satisfaction	I was drawn into my task of exploring the website	3.3	0.65
Satisfaction	I was moved by the experience	3.4	0.63
Satisfaction	I was curious to explore more about the contents of the website	3.6	0.25
Satisfaction	I would recommend this website to others	3.7	0.23
Satisfaction	The time I spent exploring this website was worthwhile	3.7	0.32
Satisfaction	Score for category	3.5	0.42
Perceived Usability	I felt discouraged while interacting with the experience	2.0	1.4
Perceived Usability	I felt annoyed while interacting with the website	1.6	1.0
Perceived Usability	The website was mentally taxing	1.7	0.93
Perceived Usability	I found the experience confusing to navigate	1.9	1.3
Perceived Usability	I felt frustrated during the website	1.8	1.1
Perceived Usability	Score for category	3.2	1.1

Table 5.1 Summary of response data to **likert** scale questions (n=24).

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Figure 6.1 *Free worker buildings.*

RECOMMENDATIONS AND CONCLUSIONS

RECOMMENDATIONS

Our prototype illustrates the potential for digital reconstruction to facilitate dialogue and drive interest in Spaç Prison. Findings about our prototype indicate that it is worthwhile to continue this project. We have highlighted key areas where our prototype and findings can serve as basis for continuation. Our design considerations and the results of our testing can provide guidance to CHwB in pursuing further work in digital reconstruction.

Collect More Testimony

We suggest that future work on the model involve the collection of testimony from a much broader selection of sources. The prototype contains stories from two interviews of former prisoners, and published testimony from two others. This provides users with a very narrow view of Spaç's history. To provide a more complete depiction of the prison, our team recommends that CHwB, or any other party interested in expanding the model, focus on collecting more testimony that is strongly associated with locations in and around Spaç. We recommend they consider Forensic Architecture's situated testimony to improve the digital reconstruction.

Continue Modeling Spaç

We recommend that CHwB continue recreating more buildings and locations, standing or not, associated with Spaç. A great deal of the history of Spaç Prison is hard to represent in the model as it currently exists. Our team created only the buildings which were possible to quickly recreate from plans and historical photographs. This left us with no representation of the compound where Fabian Kati lived with other political prisoners towards the end of Spaç Prison's operating years.

While our initial terrain model provided a backdrop for the prison, we believe that the reconstruction would benefit greatly if CHwB improved the accuracy of the terrain model. There are features of the physical site, like the flat exercise area, that appear rough and jagged in our current representation. CHwB should work with an engineer or artist experienced in the 3D modeling of terrain to create a more visually impressive and authentic model.

Implement New Features

We selected only a handful of features we observed in other digital reconstructions. These features include 3D modeling, scrollable text, integrated 360 photos, hotspots and clickable buildings. Features left unimplemented include: labels for 3D models, combining a satellite photo with the terrain model, and the ability to switch between languages (particularly between Albanian and English). We recommend that CHwB seek partnerships with university computer science students to implement these features, and any other features that they feel will complete the prototype digital model. Many of the features present in the Saydnaya model (https://saydnaya.amnesty.org/) may be worth exploring. Furthermore, we recommended that WPI supports this endeavor with an Independent Study Project.

CONCLUSION

Our sponsor was interested in exploring the ability of digital reconstruction to help the Spaç Prison reach its full potential in facilitating dialogue around the recent past. Our tests of a prototype digital reconstruction show a great deal of potential in this area. Our results suggest that digital reconstruction has the power to engage users, encourage them to share memory, and to evoke curiosity.

Additionally, the prototype demonstrated the validity of Forensic Architecture's situated testimony technique for eliciting memory. The prototype triggered specific memories which Fabian Kati did not remember or share before he observed it in the reconstructed model. He was also able to share details about buildings we did not digitally reconstruct, and used the terrain model to anchor his descriptions in place. These results line up perfectly with what Forensic Architecture suggests an interview with a preliminary model can accomplish.

Given the level of engagement, the new memories digital reconstruction can transmit to its audience, and the old memories it can evoke from them, we believe that a Spaç Prison digital reconstruction would be useful in transforming Spaç Prison into the "resource for healing" that CHwB believes it could be (Bllaci et al., p. 4). A detailed reconstruction could enhance the former prison's capacity to serve as a cultural monument and to foster dialogue around the communist past. In this way, digital reconstruction could serve as part of the solution to what former Professor Lori. E. Amy characterized as the disruption of the "lines of transmission" of Albanian memory (Bllaci et al., 2016, p. 4).

GLOSSARY

Aesthetics: The sensory and visual appeal of an interface.

Affective: The emotions a user experiences during an interaction. (connected to perceived usability)

Balance: (Design principal). The pleasing distribution of the visual weight of objects, colors, texture, and space.

Blender: A 3D artists tool used to create models.

Computer aided design (CAD): An engineering drawing of either two dimensional or three-dimensional objects. In CAD software, the engineer can move around the object they create, measure it and modify it.

Contour lines: Show areas of equal elevation between different topographical areas. Each line shows that there is a known difference in height between each line. The distance between each line is also known, so that the slope of the land between each line can be calculated.

Digital reconstruction: Using digital technology to represent the physical state, past or present, of something or somewhere.

Endurability: The likelihood of a user to remember an experience and their willingness to repeat it.

Extrude: Extrude in the context of CAD is to create a three-dimensional object that has the same dimensions as its two-dimensional object with the addition of a third dimension that is defined by the user that extends it out into the third axis.

Forensic architecture: “The name of an emergent academic field [...] developed at Goldsmiths. It refers to the production and presentation of architectural evidence —relating to buildings, urban environments—within legal and political processes (Forensic Architecture, n.d).”

Framework: Technique for evaluating the effectiveness of museum exhibits.

Human-computer interaction (HCI): A multidisciplinary field of study focused on the design and use of technology. HCI focuses particularly on the interfaces between people and computers.

Hypertext: One or more documents which contains within it a link to another, typically hypertext, document.

Homepage: The main page of a website, typically the first page seen, which typically connects to the other pages of the website.

Involvement: The connection a user makes to their online interaction. Relies on a user accessing an online interaction as either fun, or necessary to satisfy and important need.

JavaScript: A web-based computer language.

Library: A collection of software programs made available to others, generally serving some specific purpose.

Likert scale: A numeric scale used to quantify people’s opinion on a topic.

Memory science: An emerging field, dedicated to the study of the impacts of memory and the mechanisms that drives it. Includes, but is not limited to, work in psychology, neuroscience, cultural heritage, history, and sociology.

Novelty: Users find new and unfamiliar experiences exciting. Feelings of discovery and curiosity make users more likely to engage and explore.

Pannellum: A panorama or 360 degree photo viewer for the Web.

Perceived usability: The overall emotional experience of interacting with something.

Satisfaction: The combination of Involvement, Novelty, and Endurability. Satisfaction describes how much a user enjoyed an online experience.

Situated testimony: A testimony elicitation technique that involves presenting witnesses with a preliminary version of a model and asking them questions about it. The testimony is then used to further improve the model.

SketchUp: A CAD program designed to be used by architects.

STL: Stereolithography file format, a file type used by many different software packages that encodes a 3D Model.

STLLoader: Sub library of Three.js which loads STL files and displays them.

Symmetry: (Design principal). Elements are arranged in the same way on both sides of an axis. Contributes to the balance of a design.

Three.js: Javascript library for display and manipulation of three-dimensional objects.

Two-Photo Page: An internally defined term referring to the pages of our prototype which feature two photographs combined with text.

User engagement: “User engagement is the emotional, cognitive and behavioral connection that exists, at any point in time and possibly over time, between a user and a resource” (Attfield et al, 2011).

User engagement scale (UES): Measurement tool for engagement with websites.

World Wide Web, the: also the Web. The part of the Internet consisting of documents and other pages which are publicly accessible via a web browser.

3D Model: A mathematical representation of a surface or object in three dimensions.

360 degree photographs: Photos taken using a 360 degree camera. This camera has two camera sensors with very wide-angle lenses that when processed with software, creates a full panoramic image centered around the camera. These photos are saved as a flat JPG format and are not a CAD.

360-Photo Page: An internally defined term, referring to the pages of our prototype which feature 360 degree photographs combined with text.

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APPENDIX A: TABLE OF CORE LOCATIONS

Location	Internal Building Labels (See Fig 1)	Current State	Description
Commissary	Building G.5	Standing	Building where prisoners ate and discussed
Family Meeting Room	Building G.3b	Standing	Where family visitations occurred, attached to Kommandant building.
Guard tower	Building G.3a	Standing	Guard tower that overlooked the main entrance into the site.
Isolation Cell	NA	Destroyed	Set of five former cells, approximately 1 by 1.5 meters, destroyed after the prison closed.
Kommandant	Building G.3	Standing	Three-story administrative building that housed prison administration.
Main Prison Block	Building G.6, G.6a	Standing	Main cell block. It is comprised of two cell buildings.
Multipurpose Building	Building G.4	Restored	Multipurpose Building. Served many purposes: Officers quarters, supply shop, recreation room, etc.
Roll Call Platform	NA	Destroyed	Outdoor location where prisoners were counted three times daily. Digitally reconstructed from archival photographs.
Volleyball Pitch	NA	Outdoors	An outdoor area in the middle of the prison compound where prisoners were allowed to exercise.

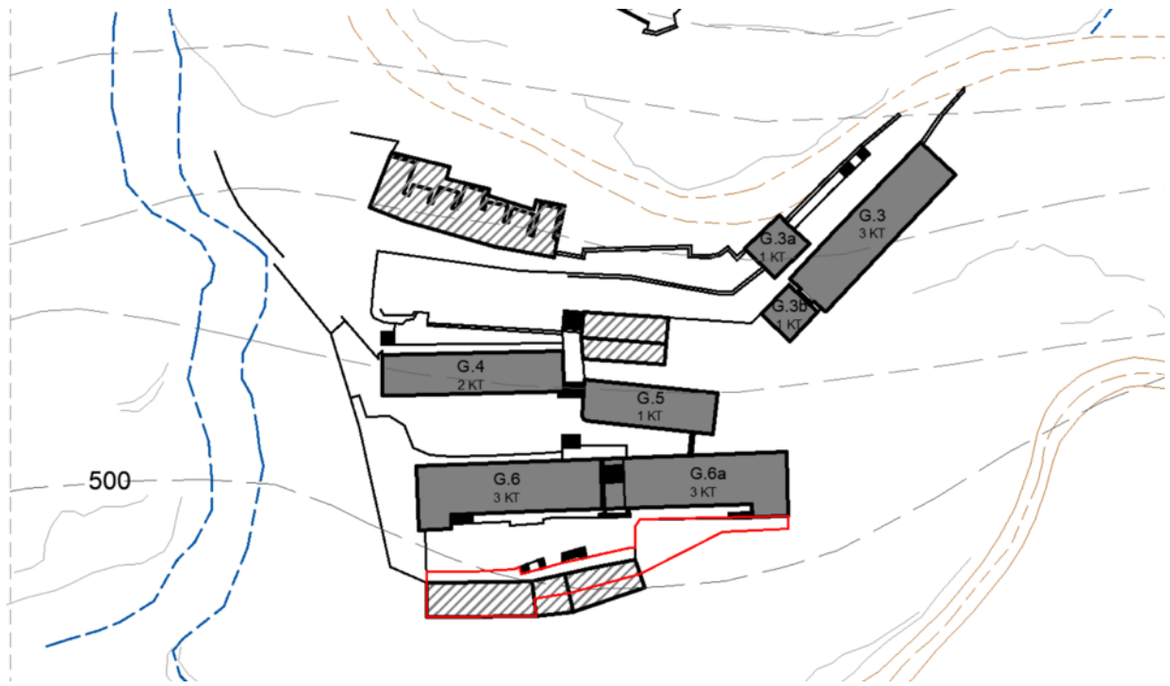

Figure 1. Architectural site map of Spaç Prison with old military contour lines visible (dashed lines)

APPENDIX B: EMAIL SENT OUT TO TEST THE MODEL

Hello,

We are a group of students from an American university, Worcester Polytechnic Institute, and one student from Tirana University. The reason we would like to complete this survey is that we are helping Cultural Heritage without Borders to preserve Spaç Prison. Your participation in this survey is completely voluntary. If you agree to participate, we will ask you to complete a short survey about your reaction to a prototype digital model of the Spaç Prison. Your name will not be associated with any of the responses that you provide.

[Link to Survey omitted] (For survey question, see next page)

[Link to Prototype omitted]

Please complete the survey after you have explored the model. The model should be viewed on a laptop for best results. Click and drag to move the camera, and click on red objects to view stories. Respond in English if possible, but feel free to use Albanian if needed.

The stories mention Zenel Drangu, a former prisoner. He served 20 years and his stories are placed with the locations he mentions.

Thank you,

Michael Clements, Leo Gross, Elizabeth Kirschner, Zetta Rajaniemi, Kristi Zoto

Demographic: Albanian National, Albanian descent, other

Age Category: 18-28, 29-49, 50+

Aesthetics

1. The experience appealed to me visually. (likert)

2.I liked the graphics and visuals used in the website. (likert)

3. I liked the layout of media elements in the website. (likert)

4. The website was aesthetically appealing. (likert)

Satisfaction

1. I was drawn into my task of exploring the website. (likert)

2. I was moved by the experience. (likert)

3. I was curious to explore more about the contents of the website. (likert)

4. I would recommend this website to others. (likert)

5. The time I spent exploring this website was worthwhile. (likert)

Perceived Usability

1. I felt discouraged while interacting with the experience. (likert)

2. I felt annoyed while interacting with the website. (likert)

3. The website was mentally taxing. (likert)

4. I found the experience confusing to navigate. (likert)

5. I felt frustrated during the website. (likert)

Was one of your family members persecuted: Prefer Not to Answer, Yes, No

Short Answers:

What 3 emotions would you use to describe your experience with this website:

Is there a specific story that impacted you? What about that story stuck out to you? What did you think that story was about?

Is there a physical location represented in the website that you feel like you connected to?

Would you want to visit this location?

APPENDIX C: PERSON HOURS COMMITTED TO PROJECT

Task	Person-hours
Selecting tools	16
Building G.6 & G.6a	40
Building G.4	6
Building G.5	3
Building G.3, G.3a G.3b	16
Terrain Version 1	16
Terrain Version 2	10
Terrain Version 3	8
Terrain Version 4	26
Main Display	40
JSON Population	24
Web Page design	20
Building Placement	24
Documentation	8
Total:	257 hrs