



Digital Tools for Critical Cultural Heritage

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Thesis to obtain the Master of Science Degree in

Information Systems and Computer Engineering

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November 2022

This work was created using \LaTeX typesetting language
in the Overleaf environment (www.overleaf.com).

Acknowledgments

First of all, I would like to thank my supervisors professor Valentina Nisi and professor Paulo Bala for their guidance, sharing their knowledge, support, and valuable feedback without whom this thesis would not be possible.

I would like to thank my parents Paula and Jorge for their friendship, encouragement, and sacrifices. Without you, this wouldn't be happening. To my brother Nelson, for your endless support, for always encouraging me to do my possible best, and for making this last few weeks a little bit easier on my shoulders.

To Vasco, for holding the fort and my mental sanity. You are the best partner in crime of whatever insane ideas I decide to get myself into. To Daniela, for always being there during the good and bad times, and for every kinder you brought to save my tears. To Francisco, for making me laugh through the hard times and making the best out of the worst. To Leão, for your friendship, teachings, and support throughout these last years. I'm very grateful to have shared this thrilling roller-coaster ride with you guys.

Last but not least, I would like to thank all participants of my study, your volunteering and interest in this topic were priceless and this work would not exist without you.

To each and every one of you – Thank you.

Abstract

In the cultural heritage field, the absence of representative and diverse perspectives has fueled a new wave in heritage studies that defies the dominant theoretical and practical discourse. This dominant 'authorized' discourse defines heritage as non-negotiable, forcing a global perspective of its value, perpetuating the social exclusion of certain communities. Several initiatives have emerged to amplify the 'unauthorized' heritage discourse. One example is *Migrantour*, a counter-mapping initiative of intercultural guided urban walking tours designed and conducted by migrant community members to promote intercultural dialogues, exploration of cultural heritage sites, and discussion of critical cultural heritage. However, there are still issues regarding accessibility, inclusivity, and preparation for the tours. Aligned with the values of Human-Computer Interaction, this work embraces a user-centered approach to understand how digital tools can support these alternative tours in enticing and preparing possible visitors to interact and reflect on cultural heritage. To achieve this, qualitative user research was conducted in the form of semi-structured interviews and a co-design workshop to guide the design and implementation of "Tell a Story" - a digital tool that expands the authorized discourse to include inclusive heritage, allowing users to explore and reflect on both heritage discourses, as well as prepare to engage with critical cultural heritage activities.

Keywords

Human-Computer Interaction, User Experience, Cultural Heritage, Critical Heritage, Intercultural Dialogues, Authorized Heritage Discourse

Resumo

Na área do património cultural, ausência de perspectivas representativas e diversas levou à aparição de uma onda de estudos que desafiam o atual discurso teórico e prático que domina a área. Este discurso dominante 'autorizado' define o património como algo não-negociável, forçando uma perspectiva global sobre o seu valor, perpetuando a exclusão social de certas comunidades. Diversas iniciativas surgiram para ampliar o discurso patrimonial 'não-autorizado'. Um exemplo é a *Migrantour*, uma iniciativa que usa excursões guiadas concebidas e conduzidas por membros da comunidade migrante para promover diálogos interculturais, exploração de sítios relacionados com património cultural e discussão sobre património cultural crítico. No entanto, ainda existem várias questões a abordar em termos de acessibilidade, inclusão e preparação dos possíveis participantes das tours. Alinhado com os valores da área de Interação Pessoa-Máquina, este trabalho adota uma abordagem centrada nos utilizadores para entender como é que ferramentas digitais podem apoiar estas tours alternativas em motivar e preparar os seus possíveis visitantes para interagir e reflectir sobre o património cultural. Para isso, investigação qualitativa centrada nos utilizadores foi conduzida na forma de entrevistas semi-estruturadas e um workshop de co-design para guiar a concepção e implementação do "Tell a Story" - uma ferramenta digital que expande o discurso autorizado para incluir o património inclusivo, permitindo que os utilizadores explorem e reflitam sobre ambos os discursos patrimoniais, assim como se preparar para interagir com atividades de património cultural crítico.

Palavras Chave

Interação Pessoa-Máquina, Experiência do Utilizador, Património Cultural, Diálogos interculturais, Discurso Patrimonial Autorizado

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Acronyms

AHD	Authorized Heritage Discourse
API	Application Programming Interface
APIs	Application Programming Interfaces
CMS	Content Management System
CSS	Cascading Style Sheet
CH	Cultural Heritage
DOM	Document Object Model
HCI	Human-Computer Interaction
HFP	High-Fidelity Prototype
HTTP	Hypertext Transfer Protocol
HTML	HyperText Markup Language
LFP	Low-Fidelity Prototype
SUS	System Usability Scale
UI	User Interface
XML	Extensible Markup Language

1

Introduction

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Cultural diversity has been present in European history as a product of people's interactions and intercultural exchanges [1]. However, throughout the years, a rise in migration has led to an increase in tensions and xenophobia discourse in society [1]. In an attempt to counteract this, some European countries have proposed frameworks such as the *Faro Convention on the Value of Cultural Heritage for Society* [2] and the *White Paper on Intercultural Dialogue – Living Together As Equals in Dignity* [1], that aspire to promote intercultural dialogues as well as to foster respect and acknowledgment of the influence of multiple different cultures on society as we know it.

As many approaches for intercultural dialogues head toward digital technologies, a critique emerging on heritage studies reflects on the issue of using these tools without concern for who is participating in this discussion [3]. This attitude leads to the propagation and normalization of the idea of a consensual definition of heritage defined by those with power, ignoring and silencing the existence of multiple alternative interpretations [3,4]. Smith [3] has explored and analyzed this western dominant discourse about heritage and has designated it as Authorized Heritage Discourse (AHD).

The AHD is inherently problematic as it privileges western conceptualizations of heritage and perpetuates an idea that heritage is defined as something visitors are led to and taught about but are not welcome to actively engage with it [3]. However, this discourse has not remained unchallenged. Article 27 of the Universal Declaration of Human Rights [5] states that everyone has the right to actively engage in the construction of cultural heritage and contribute to its shape [6,7]. Communities from within many western countries have started to contest and strive for a more inclusive narrative [3,4].

One course of action was the creation of counter-mapping initiatives that defy the AHD and fight the xenophobia discourse along with social stigmas [8]. The activities provided by these organizations consist of alternative guided tours that allow the members of communities at risk of social exclusion to guide visitors through a city tour around cultural heritage sites while exposing their personal views of the city, contributing to the progression and preservation of a more inclusive discourse [8]. Such examples are *Migrantour*¹ and *African Lisbon Tour*². *Migrantour* focuses on migrant heritage and seeks to promote intercultural dialogues with the visitors, empowering the marginalized voices and fostering social inclusion [8], and *African Lisbon Tour* focuses on colonialism and history of slavery, also promoting intercultural dialogues with the visitors, to bring focus to the other side of history unknown to most.

Over the summer of 2021, the author joined a team of researchers conducting qualitative research under the project *MEMEX*³ to explore intercultural dialogues and understand how to design new interactive digital technologies to support it. To assist the investigation, the team worked alongside *Migrantour* and *African Lisbon Tour* who provided intercultural guided urban walking tours in the middle of the city of Lisbon, facilitating the visitation and exploration of multiple distinct heritage sites. The individual ex-

¹<http://www.migrantour.org/>

²<https://africanlisbontour.com/>

³EU project for storytelling and cultural heritage for communities at risk of social exclusion

periences of engaging with the physical and discursive context of the sites were documented by using auto-ethnography, a qualitative research method that uses the personal experience to reflect on an occurrence [9]. The work described in this document is the continuity and development of this research, focusing on how digital tools can support alternative guided tours in creating interactions that helps the visitors prepare, engage, and reflect on heritage.

1.1 Objectives

The focus of this work was to develop a solution that bridged cultural heritage resources, users, and interactive digital technologies, to support the diffusion of a more inclusive heritage narrative that challenges the AHD and fights the xenophobia and anti-migrant sentiment present in society, as well as support these alternative guided tours in exposing and spreading their views of cultural heritage and help the visitors know, prepare, and engage with their future tours without compromising the experience of performing a real tour.

By embracing an user-centered approach, this work focuses on the users' needs and requirements, as well as being driven and refined by their feedback, throughout every stage of the process of designing the digital tool. This approach not only incorporates the users' voices during the design process and its outcome, but also allows us to use critical discourses to improve the experience of interacting with and reflecting on cultural heritage. Furthermore, the result of the intersection between the fields of Human-Computer Interaction (HCI) and critical heritage open the current heritage discourse to other narratives, contributing to a more inclusive discourse.

To assist our design process, user research was conducted with possible visitors of the *Migrantour's* alternative guided tours with migratory backgrounds to help us answer the main research question of **how can digital tool support these alternative guided tours in enticing and preparing its visitors to interact and reflect on cultural heritage.**

1.2 Document structure

The rest of the document is structured as follow:

- Chapter 2 presents the background of the concepts used in the research as well as an analysis of the related works relevant to this research. It explores what has been done concerning the intersection of the fields of cultural heritage, Human-Computer Interaction, and heritage discourse.
- Chapter 3 presents the strategies and rationale followed during the user research process, detailing data analysis, findings, and implications for the design of the solution.

- Chapter 4 presents the details of the design process of the digital tool resulting from user research.
- Chapter 5 presents the implementation details of the digital tool and evaluation conducted as well as its results.
- Chapter 6 presents the conclusions of the whole process described in this document and the reflections on the work that needs to be developed in the future.

2

Related Work

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The current chapter presents fundamental concepts and related work developed in the field that carries relevance to this research. Section 2.1 presents an outline of the most relevant concepts regarding heritage, explores the importance of Human-Computer Interaction in the field of cultural heritage, how are they connected, and what are the benefits of considering a Human-Computer Interaction approach. Section 2.2 explores the new wave in heritage studies that critiques the authorized heritages discourse and the related work done in the field of heritage. Section 2.3 presents the role of intercultural dialogues and their respective importance in modern societies. Section 2.4 introduces an analysis of the related work in which the researchers have developed digital technologies in the heritage field. Lastly, section 2.5 summarizes the previous sections, identifying research opportunities.

2.1 Heritage

The concept of heritage describes the legacy of an element that is inherited from generation to generation and can be categorized accordingly to its cultural, natural, or historic value [10, 11]. However, heritage is not merely a passive preservation process of elements from the past, but instead is an active collection process of elements that carry a particular set of values that we still identify with, and wish to keep engaging with in the future [10].

Cultural heritage can be analyzed and categorized into two types as seen in fig. 2.1. The physical body of the element in question that holds the ability to be seen or touched is identified as tangible cultural heritage [10, 12]. However, the remaining abstract form is identified as intangible cultural heritage and may exist only in the memories of community members [10, 12, 13]. For instance, elements that are considered tangible cultural heritage may comprise physical artifacts, buildings, or landscapes, while the elements characterized as intangible cultural elements may comprise beliefs, values, traditions, and knowledge [11]. Nonetheless, tangible heritage and intangible heritage are inextricably connected.

Researchers aim to preserve both the tangible as well as the intangible heritage [14], as these are the elements that define us as individuals and reflect the cultural identity of a society [10, 12, 15]. For this reason, the preservation and conservation of cultural heritage are considered of great importance.

HCI is a multidisciplinary field of research that has also expanded into cultural heritage and has been supporting its main areas of intervention such as preservation, dissemination, and engagement with the public audience through the design and use of digital tools [16–18]. The combination of both fields allows for the creation of new opportunities to enrich the cultural experience. Furthermore, it also allows for research in modern heritage approaches [17].

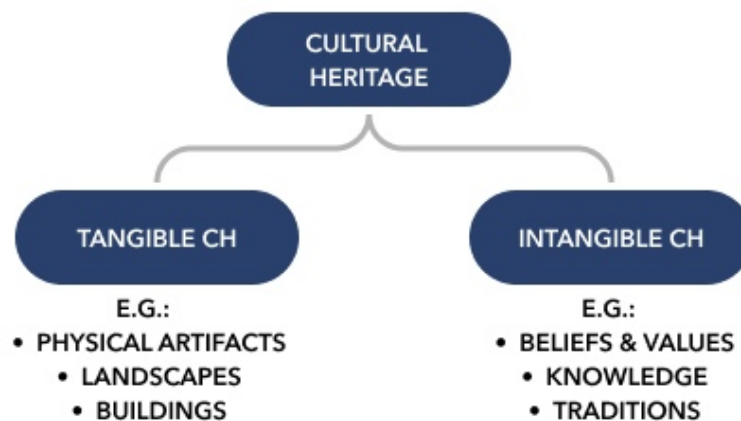


Figure 2.1: Cultural Heritage Classification

2.2 Modern heritage approaches: critical, plural and future heritage

The work of Schofield et al. [17] has researched and examined the new wave in heritage studies that looks at it through a critical lens, focusing on issues that affect the present, and introduces three main approaches in modern heritage research: **critical heritage**, **plural heritage**, and **future heritage** [17].

Critical heritage addresses a critical perspective that provokes reflection and exposes the issues regarding the social, political, and cultural complexities around heritage [17, 19, 20]. This subject has been a talking point in heritage studies and has grown significantly through the recent years as it questions the idea of consensual heritage, which naturally challenges the AHD [19].

Researchers and practitioners have been exploring critical heritage as a participatory approach, in an attempt to improve the design of a cultural heritage experience. Claisse et al. [19] argues the impact of how more reflective design practices that involve critical discourses can have on reshaping the design of interactive exhibitions and consequently improve the visiting experience. This work reiterates the importance of reconsidering how these visiting experiences are conducted and shows concern about whom is involved in this dialogue. Terracciano et al. [21] created a multi-sensory digital interface that allows users to explore the meaning and value of heritage in multicultural communities, aiming to provoke intercultural dialogues and stimulate a critical understanding of heritage.

Although critical heritage bears great value and relevance, we must be aware of the implications it brings such as the potential or limitation when critically engaging with alternative points of view of heritage that may originate issues of conflict and ideological tensions like the legitimization or reinforcement of existing power relations [22].

Plural heritage acknowledges the existence of alternative points of view on the same heritage and accepts multiple and contrasting interpretations, contributing to a more polyvocal narrative, a narrative that wants to move forward from the authorized discourse and allows cultural heritage to be an active process where personal experiences are actively created, used, and negotiated [4, 18, 19].

Future heritage embraces a future-oriented design practice that critiques present issues and opposes the authorized discourse by rejecting binaries such as tangible and intangible heritage [17]. As it is concerned with the heritage that doesn't exist yet, it theorizes about ways to help the heritage field to anticipate and work through inevitable changes to support and ensure the continuity of heritage [17].

2.3 Heritage for intercultural dialogues

The current discourse in cultural heritage has adopted a modern heritage approach when discussing intercultural dialogues. These intercultural dialogues are defined as conversations that take place between individuals with different cultural backgrounds, and they are considered to play an essential role in today's society. It allows us to move forward together past our cultural differences, promoting awareness, understanding, and tolerance as well as preventing conflicts and creating a sustainable environment that fosters inclusion and cohesion in society [1]. For it to thrive, we must ensure a safe and non-judgmental environment for individuals to respectfully exchange their views with others whose opinions might differ [1].

Intercultural dialogues also respect plural and critical heritages, representing an example of unauthorized heritage discourse (or inclusive heritage discourse), as opposed to the AHD. One example of such has been emerging in the industry of tourism through the cultivation and conduction of such intercultural dialogues. As previously mentioned in Chapter 1, some initiatives seek to stimulate intercultural dialogues with members of communities at risk of social exclusion using alternative guided tours to educate people and fight the growing social stigmas [8].

2.3.1 Alternative guided tours

Tourism has been used to promote active audience engagement with the physical environment, but the lack of connection and authenticity it provides has led to new forms of tourism [23]. While some may take the form of slum tourism (a controversial embodiment of tourism that consists of capitalizing on the exploration of an already marginalized experience [23] such as visiting *favelas*), other forms focus on responsible social tourism practices. Social tourism encompasses many activities, such as alternative guided tours, that attempt to create new opportunities that contribute to the improvement of the life of disadvantaged citizens, while also challenging and transforming people's perceptions of problems present in modern society [8, 23].

While standard guided tours bring focus to common historic places and monuments, alternative guided tours target the visitors' focus on history that otherwise would go unnoticed in plain sight. These alternative guided tours offer a distinct critical experience as they are designed by the members of communities at risk of social exclusion where they express their view of the cities and personal experience, creating emotional connections and promoting intercultural dialogues with the visitors engaging with the tour [8, 23]. As a consequence, each tour experience is unique.

Although social tourism-based initiatives have produced efforts into participatory storytelling to give the guides a sense of ownership of their content, visitors and other stakeholders are critics of not knowing if the content they are exposed to truly is aligned with an inclusive discourse or if these types of initiatives promote a more slightly restrained narrative [23]. In light of this, this semi-supervised approach has originated a grey area concerning the heritage discourse and has been nominated as semi-authorized heritage discourse.

The following initiatives presented below perceive their guides as locals who have experienced the physical and socio-economic environment, and therefore have the authority to talk about these places, which differentiates them from slum tourism initiatives.

Migrantour, mentioned in Chapter 1, is a European network of intercultural guided urban walking tours that focuses especially on the migrant heritage that has established a new opportunity to bridge tourism and a more inclusive narrative by creating guided tours that expose the view of the migrant and promotes educational intercultural dialogues while visiting cultural heritage sites. This initiative aims to move beyond promoting tolerance and cultivate broad-mindedness and social inclusion to temper with hostility feelings towards outsiders [8].

African Lisbon Tour, mentioned in Chapter 1 as well, provides guided urban walking tours that also aim to bridge tourism and inclusive heritage discourse, focusing on teaching visitors about the real African History of slavery and colonialism around the city of Lisbon. This tour promotes intercultural dialogues through an open debate about topics that have been treated as taboo.

Unseen Tours¹ is another set of guided urban walking tours that take place in the city of London but with a distinct focus on raising awareness of homelessness while creating a new opportunity for income for these vulnerable individuals. In this case, the visitors explore the city guided by former or homeless individuals, who designed the tours and their content by themselves. This initiative also defies the AHD as it allows the tour guides to share their personal experience and views of the city with the visitors participating in the tours.

Shade Tours² is one more example of an initiative that provides urban walking tours and aims to empower disadvantaged individuals by giving them new opportunities, motivation, and income. These alternative guided tours cover the topics of poverty, homelessness, refugees, integration, and addiction

¹<https://unseentours.org.uk/>

²<https://shades-tours.com/en/home/>

to drugs. The tour is guided by the homeless, refugees and addicts themselves, giving the visitor a new educational and critical perspective on the city.

Lastly, **Querstadtein**³ provides urban walking tours guided by former or homeless, or refugee individuals. The guides are responsible for creating the routes and their contents as well. This results in each guide providing a new story and a new tour with new monuments and landmarks, allowing the visitor to discover a new side of the same city through a different perspective each time they engage with such tours.

2.4 Digital Tools for cultural heritage

Emerging technologies are transforming how we interact with cultural heritage. These may embody a wide range of formats going from the digital documentation and platforms for its transmission [11], interfaces that allow exploration of cultural heritage repositories [16], geotagging systems that create routes in cultural heritage sites [24], games for education [25], personalized online or on-site museum experiences, [26, 27], and even interactive virtual tours [28].

Aligned with cultural heritage studies, HCI has supported the research and design of these new interactive digital technologies. Several works that comprise an intersection between all of these fields have revealed interest in raising awareness on **accessibility** - the character of a system to be easily understood and reachable to everyone, despite their background [6] - and **inclusiveness** - understanding user diversity and the ability to make everyone feel welcome, embracing people who are constantly socially excluded or marginalized such as those who are members of minority groups [29] -, seeking to meet the needs and concerns of their possible users and urges of a more diverse audience.

Not only accessibility to cultural heritage has been recognized as a basic human right by Article 27 of the Universal Declaration of Human Rights [5] as mentioned in Chapter 1, but also without it, there will be no public to experience it, thus no collective memory will be formed [6].

As we witness the new wave in heritage studies in which heritage is examined by a critical lens that provokes reflection and exposes issues with perpetuating AHD, the need for digital technologies that support critical heritage has grown as well.

2.4.1 Digital Storytelling for cultural heritage

Digital storytelling allows people to share their own stories and experiences through the use of new emerging interactive digital technologies [30]. Although it may encompass many different forms, the goal is to present the audience with an immersive experience that reflects more interesting narrations, with which the public may create emotional connections [30, 31].

³<https://querstadtein.org/en/>

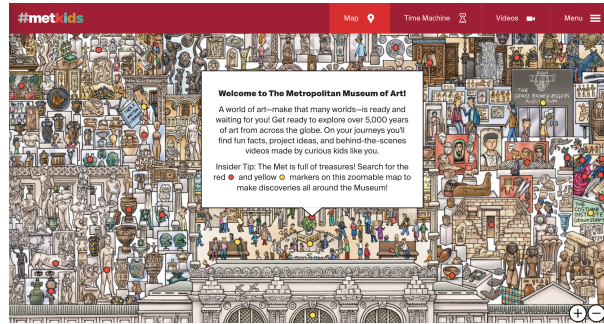


Figure 2.2: Screenshot of the MetKids' interface.

The work of Claisse et al. [19] reflects the use of interactive digital storytelling in the context of an exhibition in an 16th century Bishops' house. In this environment, the visitors may choose one of the five NFC-augmented objects and search for the interactive frames; each frame presents its respective character in a domestic scene simulating a possible view of the House in that century. To bring this exhibition into reality, the authors conducted ethnographic research followed by co-creation activities with volunteers who possess the knowledge and experience around this cultural place.

Another example that uses digital storytelling is *Emotive*⁴, an European heritage project that aims to use emotional storytelling to dramatically change how visitors experience heritage sites, with the support of digital technologies. With this project visitors can follow the characters, search for clues and overall explore the emotionally enriched cultural heritage site; whether the visitors are physically present or remote, the project embraces a mixture of physical and virtual experiences.

Let Them Talk! [32] is one more project developed to promote engagement, learning, and perspective-taking with physical interactions with cultural heritage resources within a digital storytelling experience. The context of this digital storytelling takes place in an excavated building at an archaeological site that holds great cultural value. The visitors are given one tablet device with headphones and instructed to interaction points where the storytelling would commence. The purpose is to stimulate critical reflection on the users in an attempt to promote understanding of different alternative perspectives and create an emotional connection and empathy towards the storytellers.

*MetKids*⁵ is a platform developed by the Metropolitan Museum of Art in New York City that promotes the engagement of younger audiences (between the ages of 7 to 12) with cultural heritage resources through the use of an interactive map and digital storytelling (see fig. 2.2). The system was designed for, with, and by the younger spectators and aims to create connections with the past while feeding their curiosity and sense of wonder in discovering the hidden stories behind an object.

Carletto the spider [31] is another example of a system that makes use of digital storytelling in the field of cultural heritage. The system is a storytelling-based application for an animated character

⁴<https://emotiveproject.eu/>

⁵<https://www.metmuseum.org/art/online-features/metkids/>

named Carletto that guides the visitors through a mobile device, taking into consideration the mobility and interactivity of the users with the system. The goal of this application focuses on the distribution of relevant information throughout the tour, while establishing an emotional connection with the visitors to promote the audience engagement.

2.4.2 Cultural heritage exploration in the wild

Digital interactive technologies have also been changing how visitors interact with and explore cultural heritage sites in the wild. The following works presented support the spatial and geographical exploration of heritage sites through the use of locative technologies, virtual and augmented reality.

Mapping our city monuments [15] presents a system developed in collaboration with one primary school from Greece and two from Portugal and Sweden. The students conducted guided tours around significant monuments in urban settings using GPS devices and digital cameras, documenting their experience to later be used in an educational context. The platform itself was implemented using ArcGIS Online, myHisto website, and Google Maps to contain the students gathered information. This use of digital maps in the educational context designed by students and for students has helped them link spatial thinking to cultural recognition, establishing a pedagogical interactive connection between visitors and cultural heritage.

Rock Art on Mobile Phones [33] (RAMP) is a project that consists on a set of mobile web apps that bridges interactive digital tools with the delivery of value cultural information on the site. With RAMP, Northumberland's countryside visitors are guided through and let to explore cultural sites, where they observe and search their surroundings for the carved rocks in the landscape and learn how to distinguish them from other rocks. The evaluation of the system reflected the deep engagement it had from the users end as they not only demonstrated to have learned how to confidently distinguish the rocks but also were observed exploring the cultural sites in greater details in hopes of findings rock art that may be missing from or hasn't been added yet to the apps.

*Pericles*⁶ is an online cultural heritage mapping platform that allows users to take part in the data collection process and analysis of the distribution of cultural heritage (including tangible and intangible cultural heritage) across eight European regions (see fig. 2.3). The users may take the form of visitors or contributors, providing an opportunity for both to engage with and understand the cultural heritage, particularly around maritime and coastal cultural heritage. The platform allows users to attach their data, search and filter the information. Additionally, the project also recently created a discussion group that aims to join interested parties around maritime cultural heritage to facilitate knowledge exchange, discussion, share experiences and opinions around the topic.

Besides the physical exploration of the cultural site in the wild, it is also possible to experience

⁶<https://www.pericles-heritage.eu/portalpage/>



Figure 2.3: Screenshot of the *Pericles'* interface

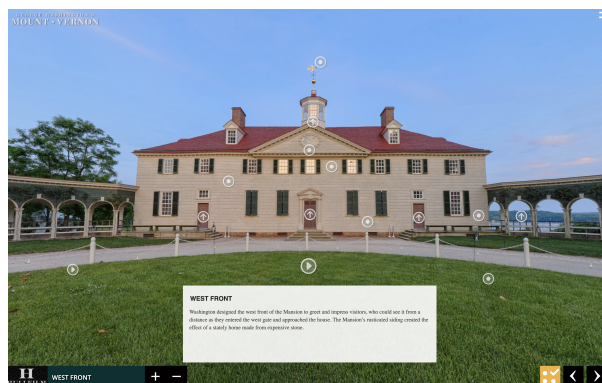


Figure 2.4: Screenshot of the interface of the virtual tour of George Washington's Mount Vernon.

the expedition through the form of remote. Napolitano et al. [28] presents an example as part of the preservation process of tangible cultural heritage through an interactive virtual tour with 360° spherical panoramas of Cuba's national ballet school. The users can explore the tour to understand how the site was constructed and observe the damages in the building. The system provides two exploration options: a user-defined path and a prescribed path, in which first one allows the user to choose a building that interests them and explore it as they want, while the second option leads the user in a predefined order. Another remote exploration example is the virtual tour of the first president of the US George Washington's Mount Vernon ⁷. The tour is interactive, allowing the users to explore the site deciding in which direction to go while the system provides information regarding the location the user is exploring (see fig. 2.4).

UNESCO ⁸ has an embedded interactive map in their platform with marked locations which withhold high value of heritage, from their authorized point-of-view ⁹ (see fig. 2.5). Each color in the visual marks is translated to a specific meaning (e.g. red represents heritage sites in danger). It supports the interactive exploration of the authorized heritage around the world, with the possibility of filtering the visual information by name, year, region, theme, category, visual content with videos or images, etc. The user can explore at their will the list of world heritage defined by UNESCO, linking interactivity with

⁷<https://virtualtour.mountvernon.org/>

⁸<https://whc.unesco.org/>

⁹<https://whc.unesco.org/en/interactive-map/>

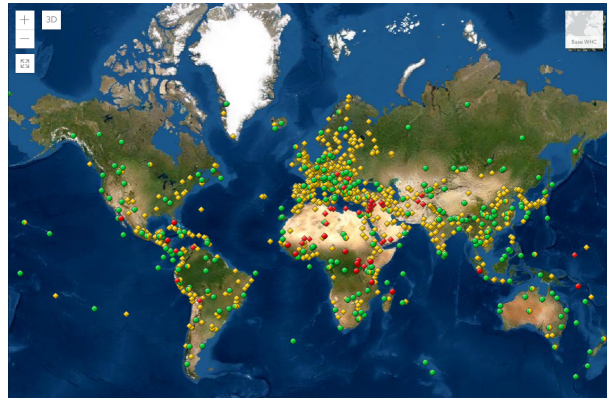


Figure 2.5: Screenshot of UNESCO's interactive map.

remote spatial exploration.

2.5 Discussion

In the recent years, there has been a growing body of work on the cultural heritage field and digital technologies, but to the best of our knowledge, relatively little on digital tools for critical cultural heritage.

Digital tools can play a critical role in the documentation, interpretation, creation, management, and dissemination of cultural heritage. But when selecting or creating digital tools for critical cultural heritage, it is crucial to consider the needs of all stakeholders, otherwise, there might exist the risk of inaccessibility, undermine the authenticity, or even impact the understanding of history, amongst other potential conflicts.

Critical cultural heritage is often viewed as a treasure to be safeguarded and protected. Additionally, there are alternative views of cultural heritage that can be seen as a resource to be used to promote social, political, and economic justice. Alternative tourism-based initiatives such as *Migrantour* have put efforts into participatory storytelling, which could help open up the discussion around cultural heritage and create a more inclusive discourse.

By creating a digital tool that supports an inclusive heritage discourse to counteract the AHD, promotes intercultural dialogues, accessible and inclusive, as well as interactive, and allows the exploration of heritage resources and plural heritages, it's possible to counteract this effect and help create a more just and equitable world for all.

In collaboration with *MEMEX* and *Migrantour*, this research will focus on how can digital tools support *Migrantour's* alternative guided tours enticing and preparing its visitors to interact and reflect on cultural heritage.

3

Methodology

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3.2 User Research – Co-design workshop	37
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As previously mentioned in Chapter 1, the research for this work started in the summer of 2021, with a collaborative autoethnography. Each documented auto-ethnography reflected a compilation of photos, sketches, and textual descriptions of the respective researcher's notes, surroundings, and personal experience during the intercultural guided urban walking tours. The documented auto-ethnographies were shared within the team of researchers using a digital whiteboard¹ that allowed the researchers to write, comment, and manage the gathered insights (see fig.3.1). Afterwards, each researcher read the remaining auto-ethnographies, and several online workshop sessions were conducted to dissect and discuss the documents amongst all researchers considering a diffractive analysis. By exploring how the researchers' experience of the tour differed, needs and challenges were identified in the act of 'visiting' that not only can be applied to improve the alternative guided tour experience but as well as using computing systems to support critical heritage. The findings that arose from this assessment focused on the physical discomfort of performing the tour and the need to physically self-prepare for the experience of heritage. These issues underlie the topics of accessibility and inclusivity as mentioned in Chapter 2, and highlight the importance to accommodate the users' needs and concerns as possible participants of the tours.

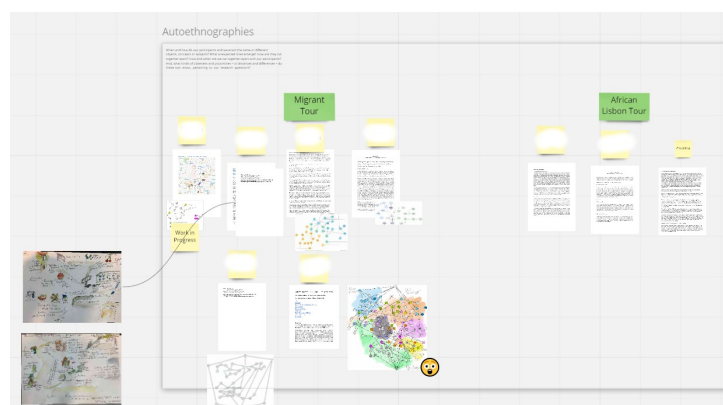


Figure 3.1: Miro digital whiteboard with gathered auto-ethnographies.

Based and inspired in this study, the project engaged with *Migrantour* in a collaboration project to design a digital technology tool that aims to support these alternative guided tours and bridge digital tools with users and heritage resources. An interview with an expert responsible for *Migrantour*'s connections took place to better understand the context of use and some user requirements for the possible solution. With this, three requirements were established that must be taken into consideration:

- Create an opportunity based on a critical heritage approach to assist and contribute to a more inclusive heritage discourse;
- Promote the interactive exploration of cultural heritage resources;

¹ <https://miro.com/pt/>

- Solution must be expandable to other European cities.

In this context, the following stakeholders – established as the most important people and organizations involved in this project [34] – were identified:

- The primary stakeholders were defined as the people who would interact directly with the system - users who are possible participants of the tours.
- The secondary stakeholders were defined by the people who would use the system occasionally - such as the intercultural guides of the tours who would be willing to share their content with the possible participants of their tours.
- The tertiary stakeholders were defined as *Migrantour* and *MEMEX*, as both would be affected by the system but do not interact directly with it.

The following steps were conducted by using a user-centered design process that allowed us to better understand users and guarantee that the developed digital tool meets the users' needs and requirements. The goal is to explore the accessibility and inclusivity regarding cultural heritage by understanding (1) **how young adults with migratory and non-migratory backgrounds individually and collectively interact with and experience the cultural heritage**, and (2) **how could we support and enhance the educational encounters through the usage of digital tools**. To accomplish this, user research explores qualitative methods (individual semi-structured interviews) and co-design methods, throughout two separate study sessions (described in the following subsections 3.1 and 3.2).

3.1 User Research – Semi-structured Interviews

The first qualitative research study was conducted in the form of individual semi-structured interviews with directed storytelling [34], followed by an exploratory website activity affiliated with the migrant community². This encompassed 15 participants and was carried out between the 1st of July 2022 and the 12th of July 2022. Mentioned above as the research goals, the following exploratory research questions were posited:

1. What do participants identify as cultural heritage and how do they get access to it?

Cultural heritage does not have a single consensual definition. For some, it may be about places and things that have been passed down from previous generations. For others, it may be their languages, traditions or even their way of life. The goal with this question is to explore if there is an intersection between the participants' definition of cultural heritage and if it's possible to

²<http://www.migrantour.org/pt-pt/migrantour-lisboa/>

categorize it, for example, between tangible or intangible as both types portrait different ways to be experienced. By exploring how the participants access to the cultural heritage, it may be possible to understand how to create a system that allows authenticity, protects the understanding history and overall mitigates the risk of potential inaccuracies.

2. How do individuals and communities value heritage?

There are many ways in which people can value heritage. For some, it may be a way to connect with the past or a source of personal identity. For others, might be a way to connect members or a way to share their values with the world. Either way, heritage can be a powerful driven force in people's lives, and understanding it may provide us some assistance in the design of the system.

3. Which factors drive the possible users' interest for or connection with cultural heritage?

To develop a system that improves the current user experience of interacting with cultural heritage, it is crucial to first understand how is it possible to make it more attractive to the public by exploring what drives their interest or connection with heritage.

4. What type of digital technologies are the participants familiar with?

To create a digital tool that is accessible in all senses of the word, it is important to explore the digital technologies with which participants are familiar with and show a preference for. To respect accessibility and inclusiveness, the goal would be to have a digital tool that is available to as many users as possible.

5. How do the participants imagine the scenario of producing and consuming digital storytelling, and what would it entail?

Digital storytelling has become increasingly popular as it holds the advantage of allowing people to share their own stories and experiences using digital technologies, creating a more immersive and captivating experience. Additionally, it can be accessible anytime and anywhere. But there are endless possibilities on how to make it more enticing to engage with heritage resources.

6. What do young people need in the pre-tour context to feel enticed to participate in *Migran-tour's* intercultural guided tours in the city of Lisbon?

The beginning of the current chapter 3 mentioned that the findings from the previous study focused on the physical discomfort of performing the tour and the need to physically self-prepare for the experience of heritage. The goal with this question is to explore deeper what the physical self-preparation would entail, as well as to search if there are other participants' needs, and what do they consist of, that must be accommodated as well, in order to provide a digital solution that satisfies and entices the possible visitors of the intercultural guided tours.

Migratory Background	1st generation	Women: 2	P1, P2
		Men: 1	P3
	2nd generation	Woman: 1	P4
		Men: 1	P5
Non-Migratory Background		Woman: 3	P6, P7, P8
		Men: 7	P9, P10, P11, P12, P13, P14, P15

Table 3.1: Synthesized description of participants (n=15) from the interviews. Participants were anonymized and identified by a number (e.g., P4 is participant 4).

A semi-structured interview with directed storytelling was chosen for this study. A semi-structured interview uses a mixture of predetermined questions that are the same for each participant but at the same time allow the flexibility to improvise follow-up questions, adjusted to each participant's speech. The directed storytelling allows the participants to tell a story by their own words, that may encompass how they interact with, search for and experience cultural heritage. Thus, different stories and preferences were expected.

3.1.1 Participants

A total of 15 participants were recruited for this study session through standard convenience procedures including direct contact and snowball sampling. As the research goal was to engage young adults, one inclusion criteria (age between 18 and 30) was used. Of the 15 participants, 11 are full-time students, 2 are full-time workers, and 1 is a part-time student as well as a part-time worker. 5 participants had a migratory background (3 women, 2 men) meanwhile the remaining 10 participants had a non-migratory background (3 women, 7 men). Participants who had a migratory background included 3 participants who have experienced the migration process themselves - also known as first-generation migrants - meanwhile, the other 2 participants were born in the country they reside with one or both parents who have previously entered that same country as migrants, being defined as second-generation migrants. Participation in this study was voluntary and they were not monetarily compensated (although snacks, Portuguese custard tart, "pastel de nata", were available to the participants).

3.1.2 Apparatus

The interviews were held in a friendly and cordial atmosphere in a hybrid form according to each participant's preference. 13 interviews were held in-person meanwhile 2 were conducted through an online video conference platform ³ as these participants (P1 and P3) were currently not living in the country where the research was being performed. At the beginning of the interview, all of the participants were presented with a consent form (a portuguese version and an english version were available to the participants, the english version can be found in annex A) that allowed us to collect their data relative to

³<https://zoom.us/>

the content of the interview to later be processed and analyzed. All data gathered during each interview included sound and screen recordings. Although the participants spoke freely, it was observed that they felt more comfortable and relaxed sharing personal information when they knew they were not being recorded. For this reason, information collected outside the recorded session was also documented in researcher's observation notes and included in the findings.

3.1.3 Procedure

Upon individual arrival to the room or the meeting on the online video conference platform, participants were presented with the consent form mentioned above and were asked to read the document before filling it in and signing it. Participants were also informed that the data gathering (audio, screen recordings, experimenter's notes, etc.) would be continuous until the end of the session and that all their responses would be anonymous, as well as that they could voluntarily quit the session at any moment without repercussions. The session was divided into three parts:

- First, an initial ice-breaker with demographic questions to help the participants feel more comfortable.
- Secondly, the semi-structured interview with directed storytelling. Due to cultural heritage being a topic that participants were not knowledgeable about, the experimenter gave a general explanation of some core concepts. It was explained to the participants what cultural heritage is and some possible forms it can take (such as traditions, values, social practices, physical places, buildings, monuments, artifacts, artistic expressions, languages, or knowledge) without any examples to not make them biased. In front of the participants, there was a short document reiterating this information to aid them to understand it clearly and allow them to focus on their personal memories instead of trying to recall all that had been said. The order of the list in the document was randomized between interviews to assure participants would not be influenced to choose the same heritage element.

The semi-structured interview with directed storytelling encompassed several questions (see table 3.2 for the predetermined questions) regarding the participant's most remarkable interactions with cultural heritage, the last interaction with cultural heritage, and how they usually seek to interact with their own or others' cultural heritage. At this stage, participants were very open to sharing a great number of personal stories, so as the conversation was going on, a lot of follow-up questions were expanding on the stories they shared.

Once participants felt like they could not remember more stories to share or anything else to add, the session proceeded to the final part.

# order	Applicable to		Question
	Non-migratory background	Migratory background	
1	X	X	Tell me a story of a memorable moment interacting with the cultural heritage of the country you were born in.
1.1		1st gen	Tell me a story of a memorable moment interacting with the cultural heritage of the country you currently live in.
2	X	X	When was the last time you interacted with the cultural heritage of the country you were born in?
2.1		X	When was the last time you interacted with the cultural heritage of the country you currently live in?
3	X	X	If you wanted to interact with the cultural heritage of the country you were born in, how would you do it?
3.1		1st gen	If you wanted to interact with the cultural heritage of the country you currently live in, how would you do it?
3.2		2nd gen	If you wanted to interact with the cultural heritage of [parents' heritage], how would you do it?
4	X	X	If you wanted to share a story regarding your cultural heritage, how do you imagine doing so?
5	X	X	How would you do if you wanted to find similar or even different stories related to cultural heritage?
6	X	X	Would you use any type of digital tools? Which ones?

Table 3.2: Predetermined questions prepared for the interviews.

- In the third part of the session, participants were first instructed to briefly explore the website on the computer in front of them before carrying on to the task where it was asked to the participants to identify how would they would book a tour of the city of Lisbon. Simultaneously, participants were asked to perform a think-aloud protocol - they were asked to continuously verbalize their thoughts as they work with the interface, which allowed us to understand what users think of the design and their misconceptions about the interface [35]. Afterwards, participants were asked about their views on the usability and interaction with the website, and what information they believe to be crucial to have before interacting with the critical cultural activities provided by the website.

All data gathered from sessions was documented with audio and screen recordings, which were later transcribed into anonymized documents for subsequent qualitative analysis. The recordings and anonymized transcripts were organized and backed up.

3.1.4 Data Analysis

The next step was to process a thematic analysis on the data of the transcripts. This was done by the author, using the qualitative data analysis software Nvivo 3⁴ looking for hidden patterns and relationships between the multiple discourses, and gathering data into identifiable topics - codes. Coding is used in qualitative analysis to allow researchers to search for topics across multiple files of data, making it easier to identify patterns and see what stands out from them [36]. The aggregation of multiple codes and respective subcodes is named a codebook. This codebook is resulting from inductive and deductive coding, as codes were constructed, and re-arranged logically and hierarchically as the data was worked through. When coding, references were not considered to be mutually exclusive and may be coded into different codes and subcodes. The final codebook with each code's definition, origin, and importance for the study can be found in the annex B, organized by its top code. The following diagrams (from figure 3.2 to figure 3.8) present a visual synthesis of the codebook.

⁴<https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/home>

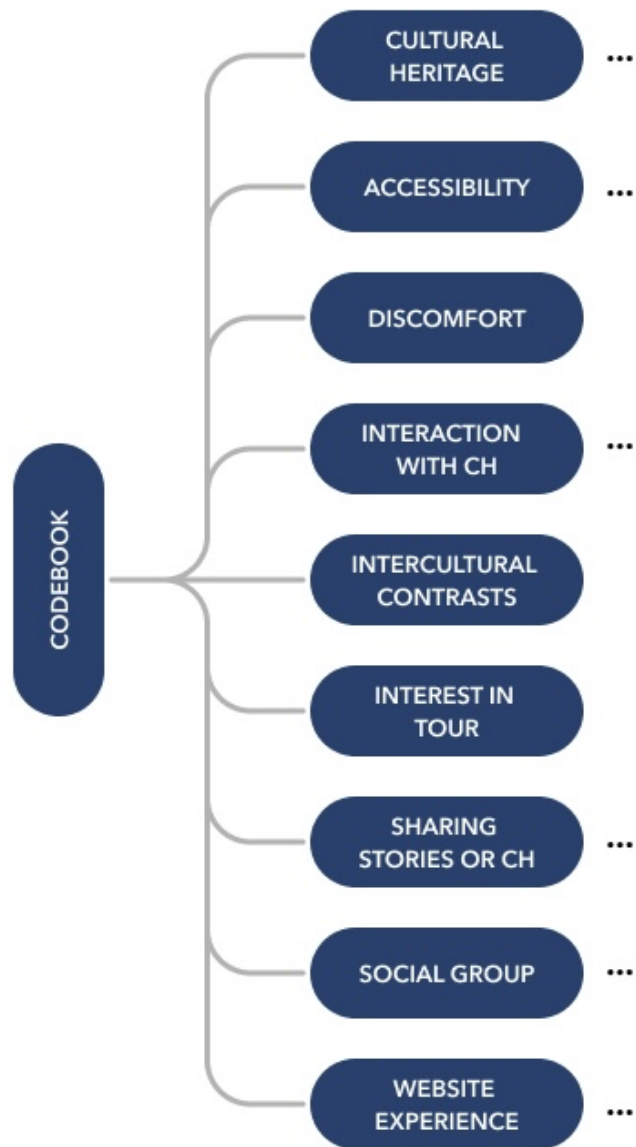


Figure 3.2: Diagram of the codebook's structure.



Figure 3.3: Diagram of the code *Cultural Heritage (CH)*

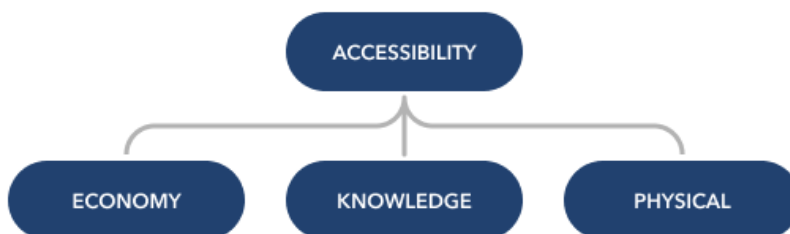


Figure 3.4: Diagram of the code *Accessibility*

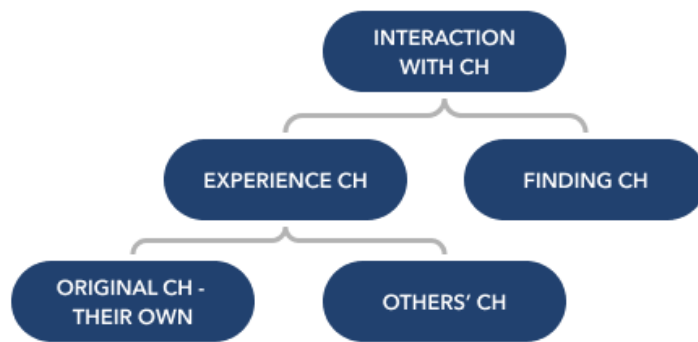


Figure 3.5: Diagram of the code *Interaction with CH*



Figure 3.6: Diagram of the code *Sharing stories or CH*

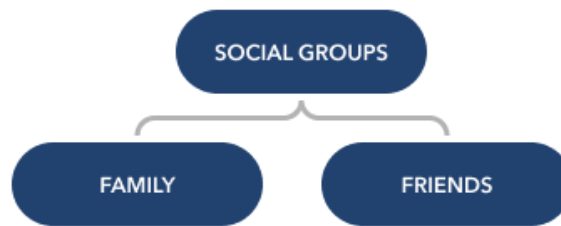


Figure 3.7: Diagram of the code *Social Group*

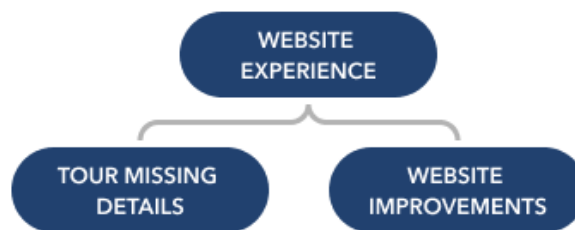


Figure 3.8: Diagram of the code *Website Experience*

3.1.5 Findings

The following section presents the findings from the interviews and respective data analysis, the answers to the research questions presented in Section 3.1, and the discussion of the main insights obtained.

3.1.5.A Cultural heritage and access

The first research question was “**What do participants identify as cultural heritage and how do they get access to it?**” and was answered by the codes and subcodes in **Intangible CH** and **Tangible CH** from **Cultural Heritage**, and **Family** and **Friends** from **Social Group**.

The participants have identified several elements of what they considered to be cultural heritage concerning both tangible and intangible forms, such as **beliefs, events, gastronomy, language, music, politics, traditions, buildings or structures, monuments, museums, objects, and physical sites**. The mentioned forms don’t represent all the possible available forms of heritage, but it verifies that the participants are drawn to both physical and abstract forms of cultural heritage resources.

Regarding how participants get access to cultural heritage, they favored to learn with **family** and **friends**, including individuals who are knowledgeable in the area. P5 stated to be currently learning their parent’s (who is a first generation migrant) native tongue with specialized professionals, to get in touch with their cultural heritage as well as obtain the skills to communicate and connect with both the parent and the remaining side of the family of said parent. Previously, the access to said heritage was limited and dependent only on their parent, until P5 engaged in a pedagogical environment that increased their access not only to the respective heritage resources but also found a community with relatable people.

P12 mentioned their preference to ask their sibling, who was a first generation migrant in the country P12 was visiting, to tour them around and help them explore the cultural heritage. Although the sibling was not a professional tour guide, they had lived as a local and had enough knowledge to give P12 access to this new cultural heritage. P9 stated to show a preference to engage in cultural activities if their friends show it too, without having any personal motives to do so. Thus, friends, family, trained professionals, and overall sense of community hold a great weight in the participants' confidence in the authenticity of heritage and history, as well as increasing the desire to explore and exchange cultural heritage resources.

3.1.5.B Valuing heritage

The second research question was "**How do individuals and communities value heritage?**" and was answered by the codes and subcodes in **Intercultural Contrasts**, **Interaction with Cultural Heritage**, and **Accessibility**.

Some participants found in cultural heritage a way to connect with the past and the present (from **Intercultural Contrasts**), as P5 stated feel more connected to their first generation migrant parent after learning the parent's language and is now able to understand what the parent has been telling him all these years in a language that P5 was not familiar with before. Some participants also found in cultural heritage a way to invigorate their personal cultural identity (from **Original CH - their own**), as P5 stated to feel ashamed of their name during their childhood as they grew up with a very different name from the other portuguese children, who were not kind nor thoughtful with P5. Despite growing up insecure regarding their heritage, once they started to learn more about it, the more it helped building their confidence in their identity. Others found in cultural heritage a way to learn about and exchange cultural values with the world as P7 stated (from **Intercultural Contrasts**) to believe that exchanging cultural values and activities with people who are external to said cultural heritage is a great way to not only get to know a little bit of the rest of the world but also to present your own heritage to people who are not familiar with it, resulting in a world with more open-mindedness and comprehension. Others found in cultural heritage a way to connect people, such as P1 who stated (from **Others' CH**) to have experienced a major cultural event in the country they are currently living now, that joined thousands of people from and external to that culture. Despite not being familiar with the values and traditions of the culture, experiencing this cultural event for the first time allowed P1 to understand the magnitude and values the culture has on the community, who also embraced P1 as one of the community.

Some participants also referenced the importance of learning about plural heritages. From **Knowledge**, P5 and P3 believe that individuals and communities have the right to learn about all perspectives on heritage concepts to form a solid background knowledge on heritage and history. P9 added that plural perspectives on the same heritage concept can co-exist in our world.

Overall, participants shared multiple different ways through which they value heritage individually or as a community. It has been stated in chapter 1 that accessibility to heritage is a basic right, and what participants shared reflected the reason why accessibility to heritage and heritage itself must be protected at all costs. From being a source to personal identity to connecting members (from internal or external communities), this sense of understanding and feeling understood crucially drives people's lives.

3.1.5.C Interest or connection to CH

The third research question "**Which factors drive the users' interest for or connection with heritage?**" was answered by the codes and subcodes in **Social Groups**, **Social Interactions** from **Sharing stories or CH**, **Discomfort**, and **Intercultural Contrasts**.

Some participants find interest in cultural heritage activities if it involves their **friends** or **family**. P10 stated to appreciate cultural heritage activities that stimulate friends or family to get together to interact and be outside of their homes. Others are driven by their upbringing and family values. P11 stated to create connections with cultural heritage through word-of-mouth since P11 was a child. By making conversation with elders of the community, P11 gets information on disregarded heritage and takes the advantage to explore it with the family.

From **Discomfort**, P7 stated to avoid activities that involve going by themselves and stating a preference in going with friends, specially to unfamiliar places. P5 mentioned the lack of support, motivation, and access to their cultural heritage complicated their journey of self-acceptance and connection with cultural heritage from the parent's side (who is a first-generation migrant).

Intercultural Contrasts also affect the participants' connection with cultural heritage. P5 stated how people sometimes are unaware of their own culture and habits, and how different they are from the rest of the world until they witness an intercultural contrast. People are not in constant contact with all cultures around the world, but when they are in contact with a different one, the intercultural contrast may originate a reflective moment that can have an impact on how they interact with or perceive other cultures.

Overall, the participants revealed to either have interest or inclination to connect with cultural heritage driven by personal motives such as their cultural identity; influence of family, friends and experienced acquaintances; and lastly they may also be driven by experiencing intercultural contrasts (willingly or unwillingly). The participants also lean towards the sense of community, by favoring activities in which they are accompanied instead of unchaperoned ones.

3.1.5.D Experience with digital technology

In fourth was the research question **”What type of digital technologies are the participants familiar with?”** which was answered by the subcode **Social Media or Online**, from the code **Sharing stories or CH**.

The participants were very comfortable with web devices, websites, blogs, and social media. Regarding social media, they used Instagram⁵, Twitter⁶, Youtube⁷, and Facebook⁸ for content production and consumption, although they use social media way more for quiet content consumption instead. For heritage research, they use online platforms like a google search engine⁹, google maps¹⁰, blogs, and forums, showing a preference for using computer devices, interactive databases, search engines, and websites.

To aid us in the creation of a digital tool that is available to as many users as possible, it was essential to understand what digital technologies and devices are the participants familiar with, and for what purpose they use them. Overall, websites, quiet consumption of social media’s content and blogs were the most stated.

3.1.5.E Digital technology for CH

The fifth research question **”How do the participants imagine the scenario of producing and consuming digital storytelling, and what would it entail?”** was answered by the subcodes **Share content**, **Social Interactions**, and **Social Media or Online** from the code **Sharing stories or CH**, and the code **Intercultural Contrasts**.

Participants are not expecting a new technology to substitute the visiting experience but instead a digital tool that allows them to search for authentic heritage resources from any place in the world as a preparation for the visiting experience. P11 stated that the hard part of their process of interacting with cultural heritage is being dependant on meeting people that have cultural heritage stories to tell, as they prefer to learn about the cultural heritage, followed by visiting it themselves or talk directly to people who have experienced it, and then reflect on the whole interaction. P7 stated to have interest in exploring intercultural contrasts, and uncovering the motives and logic behind their cultural heritage for following certain behaviors that other cultures do not follow.

The challenge for the heritage resources’ explorers lays on the pursuit of authentic heritage resources. Both statements, from P11 and P7, reflect the existence of a limitation to their search as they depend on traditional methods such as directly finding people who want to share their cultural heritage

⁵<https://www.instagram.com/>

⁶<https://twitter.com/>

⁷<https://www.youtube.com/>

⁸<https://www.facebook.com/>

⁹<https://www.google.com/>

¹⁰<https://www.google.com/maps>

or have interacted with it.

To solve both issues, digital storytelling holds the advantage of being able to provide an improved invitation to interact with cultural heritage by presenting an authentic story of someone who has witnessed the heritage, as well as being widely accessible.

3.1.5.F Self-preparation for experiencing heritage

The last research question "What do young people need in the pre-tour context to feel enticed to participate in *Migrantour's* intercultural guided tours in the city of Lisbon?" was answered by the codes and subcodes **Physical** from **Accessibility**, **Interest in tour**, **Tour missing details** and **Website improvements** from **Website experience**.

Participants found several usability issues on the platform throughout the exploratory website activity but the main challenge was the missing details of the intercultural guided tours. Participants shared their need to have specific information before participating in one of the tours, namely the:

- **duration time** of the tour (P1, P2, P3, P4, P6, P7, P8, P9, P10, P13, P14) or **walking time** (P3);
- **resting points** throughout the tour for a break (P7) if they exist;
- **price** (P1, P2, P3, P4, P5, P7, P8, P9, P10, P13, P14) of the tour and if it includes other paid attractions (P4) or transportation that may exist throughout the tour (P7, P11);
- **route** of the tour (P1, P3, P5, P8, P9, P11, P15) or a radius of the location of the tour (P1, P12);
- **start** and **end** points of the tour (P1, P3, P7, P8, P9, P12, P14);
- **starting hours** of the tour (P1, P6, P7, P8, P9, P10, P13) and **availability** throughout the week (P6, P8, P10, P14);
- **number of participants** per tour (P5, P6, P7, P10, P14);
- information regarding if the tour is prepared to accommodate people with **mobility issues** such as old age or wheelchair accessibility (P15);
- **Advice** from the intercultural guides to take into consideration when participating in their tours, such as the appropriate type of shoes, or even if a bottle of water is needed or will be available throughout the tour (P1, P9, P11, P13).

In order to feel enticed to experience this specific heritage activity (*Migrantour's* intercultural guided tours in the city of Lisbon), participants need to feel clarified and prepared to do so. To achieve this level of clarification and self-preparation in the pre-tour context, an information layer regarding the details of the tour and an advice layer concerning orientations from the guides to optimize the overall experience should be provided to the possible visitors of the tours.

3.1.5.G Additional observations

Unexpected findings were encountered from this study session regarding the importance and connection to family, sense of community, and need for face-to-face connections.

- Although it was expected the family to carry influence to some level on participants' cultural life, it was not anticipated the participants' traditions and values to be so family-focused as 11 participants out of the 15 in total referenced connections between cultural heritage and family, mostly taking the form of traditions involving family gatherings and meals.
- The need for a sense of community reflected the cultural guidance and acceptance that is missing in the participants' lives, leading their hopeful search in finding people who share similar backgrounds, stories, and experiences, to feel included and understood.
- The young participants, who grew up in a digital generation and have witnessed the impact of living fully digital during pandemic times, stated their preference for face-to-face connections instead of digital ones as they feel to be more culturally enriching to learn directly from whom has experienced said heritage.

Additionally, a behavior was observed during the individual interviews. Participants living in the same country exhibited similar behaviors and logic. In the context of the exploratory activity on the website, when confronted with an only partially portuguese translated page there were two types of behavior: 13 participants who are currently living in Portugal, are portuguese speakers, with or without migratory backgrounds, did not try to change the partially portuguese translated page into another language despite their complaints about it. Meanwhile, the remaining 2 participants who are currently living in the United Kingdom, are portuguese speakers but are in constant contact with different languages, changed the page language to English in close time frames. When asked, the 2 participants individually explained that this specific behavior has become something they inherently do due to similar situations they go through in their daily life, as usually websites are fully translated into the English language.

3.1.6 Discussion

There is no doubt of how the engagement with tangible and intangible cultural heritage is an important part in individuals and communities' lives. From the findings in 3.1.5.A, it was verified that the participants of this study group gravitate for both types of cultural heritage resources. Thus, the digital tool to be created must **respect the engagement with both types** by not excluding one or another. Additionally, the participants who share an interest to learn regarding cultural heritage stated their need to learn from other individuals or communities who are certified or knowledgeable. It is important to

note that as participants explored the topic of cultural heritage, they heavily associated it with previous personal experiences and relationship with friends and family, leading towards the **unauthorized discourse**. Therefore, to protect the understanding of history as well as the authenticity of heritage, **heritage content following an inclusive discourse will be produced using first-person heritage experiences**.

The current growing demand of accessibility to heritage resources (3.1.5.B, 3.1.5.C) instigates the development of new ways that allow heritage protection and dissemination. **Digital technologies** (3.1.5.E) not only support the heritage protection, saving it for an indefinitely time-frame, as well as support its reachability to as many interested users as possible. Additionally, can support the **pursuit of heritage resources** as well **prepare the users for the heritage experience** (3.1.5.F), instead of replacing the whole in-person experience.

Although the sample size of interviewed participants is small for generalization, the findings from this study are meant to inform the profile of possible users of the digital tool. The findings reflect the necessity of the possible users for a web-based digital technology that does not replace the in-person experience but instead allows users to explore and prepare for the interaction with tangible and intangible heritage using first-person heritage experiences. To better define the details for the development of this digital tool, the user research proceeded to a second study with co-design techniques.

3.2 User Research – Co-design workshop

A co-design workshop was conducted to craft the details for the digital tool. The goal was explore the solution space obtained in 3.1.6 and define it into feasible features.

The workshop was conducted with 2 participants with migratory background where it was discussed how can their exploration and preparation to interact with heritage resources be embodied into a digital tool. Using a card-sorting activity along with a MoSCow prioritization technique ¹¹ to understand the co-designers' mental models as well as manage the requirements for the solution by categorizing them through levels of priority (will have, should have, could have, won't have). During this workshop, the researcher assumed the role of facilitator, providing the co-designers prompts and taking notes as well as keeping a safe and open-minded environment by managing any possible strains between the co-designers.

¹¹The author had previous experience working with this methodology in the context of uncovering design opportunities for digital tools based on challenges faced by members of communities at risk of social exclusion [37].

3.2.1 Participants

A total of 2 participants (1 woman identified as P16, 1 man identified as P3) were recruited for this study session through direct contact, with the inclusion criteria of being between 18 and 30 years old, as well as having a migratory background. P16, who is a first-generation migrant, was new to the study, not having any previous contact with the theme, meanwhile P3 had participated in the prior study described in 3.1. Participation in this study was voluntary and they were not monetarily compensated.

3.2.2 Apparatus

The co-design session was conducted through an online video conference platform ¹² using a digital whiteboard ¹³ that allowed the participants to write on the cards as well as interact with them, the MoSCow matrix, and each other in real-time. At the beginning of the sessions, both participants verbally consented to a consent form that allowed us to collect their data relative to the content of the session to later be processed and analyzed. Contrary to what was done in the initial interviews 3.1, as it was noticed that participants engaged, shared, and felt more comfortable when they knew they were not being recorded, it was chosen to not record the entirety of the session but instead to take notes and screenshots throughout the session.

3.2.3 Procedure

Upon arrival at the meeting on the online video conference platform, participants were presented with the consent form previously mentioned, and they were informed that the data gathering would be continuous until the end of the session and that all their responses would be anonymous, as well as that they could voluntarily quit the session at any moment without repercussions. When all conditions were met, the co-design session began. First, an initial small talk to make participants feel comfortable, followed by an explanation of what the goal of the session was. A link for the digital whiteboard was shared with the participants, allowing them to join and interact with it in real-time.

Then, the participants were given a general explanation of the core concepts of heritage as happened in the section 3.1.3. Upon confirmation of understanding the concepts, they were introduced to the several prompts exploring the solution space and asked to discuss them:

- "Imagine you want to share a story of your cultural heritage with someone else in the world. How would you do this through the use of a web interface?";
- "Imagine you want to get to know about a story of another person's cultural heritage. How would you do this through the use of a web interface?";

¹²<https://zoom.us/>

¹³<https://miro.com/pt/>

- "Imagine you want to search for a heritage element from your hometown. How do you imagine this happening through the use a web interface?";

In each card, the participants wrote features that embodied their requirements. Each participant had a colored-coded card: yellow cards for P3, blue cards for P16, and green cards for merged or common decisions made by both co-designers. First they wrote down their individual ideas. Then, they were asked to discuss them with each other, modifying the ones that caused any divergences until a consensus was reached. Lastly, the participants were asked to discuss and sort each one of the cards into the several categories of the MoSCow Matrix displayed in front of them in the digital whiteboard comprising the four following options: "must have", "should have", "could have", and "won't have".

3.2.4 Data Analysis

The next step was to analyze all the information gathered in the co-design session through notes and the resulting matrix. The following paragraphs will examine each category of the MoSCow Matrix, the features, and the co-designers' logic behind it.

- **Must Have** category concerns the features that are non-negotiable for this project.
 - **Content** The participants want to consult heritage resources uploaded by them or other heritage experienced users. This may encompass stories, points-of-interest, events, etc., as long as it concerns cultural heritage, is authentic, and contributes to an inclusive discourse.
 - **Search** The participants want to be able to search through the available resources and engage with them.
 - **Multilingual Support** By allowing the system to support multiple languages, it will increase the efficiency, satisfaction, and loyalty of the user, as well as reducing the odds of misinterpretations due to the language barrier.
 - **Accounts** User accounts are needed to track and monitor the content populated into the system for animosities or forgery, upon uploading or at any time.
 - **Report** This is an action to be used when the content exhibits inappropriate language that are not welcome in an open-minded and safe environment (such as racism, xenophobia, homophobia, etc).
 - **Feedback** will help improve the system, content, and its features.
- **Should Have** category concerns important features that are not vital but add great value.
 - **Control** To address the co-designers concerns regarding their safety, they suggested the system allow the users to be in control of who they can hide their identity or content from if it endangers the user in question such as in current scenarios of war tensions.

- **Relevant Stories** The ability to provide relevant stories to the user based on the geolocation. This could be helpful to show content such as stories, events, etc concerning the nearest locations based on the user IP location.
- **Interactive Map** An interactive map where the users can find the heritage resources location as a form of enticement and entertainment.
- **Could Have** category concerns features that would be nice to have but will make a small impact if left out.
 - **Color and shape pins** The interactive map could have different colors and shapes to differentiate the types of heritage resources (e.g. between tangible and intangible heritage resources).
 - **Share** The ability to share the resources of the system to external platforms such as social media or embed the content into personal websites could support the diffusion of the information.
- **Won't Have** category concerns features that are not a priority for this specific time frame.
 - **Chat and Comments** between users is not a priority for the co-designers as they believe this system should not be just another form of social media but a safe environment for the exchange of diversified cultural stories.
 - **Cultural ads and Cultural businesses** Introducing targeted cultural ads or publicity for cultural business may be an interesting approach help heritage businesses related increase their value as well as generate some sort of remunerated compensation for the system if needed in the future.

The digital tool will include the features from the categories "must have", "could have", and "should have". The category of "won't have", as per definition, will be set aside for the time being.

3.2.5 Discussion

The co-design workshop was an effective experience in translating the solution space into feasible features as well as incorporating the primary users' input in the design of the digital solution. Furthermore, the participants were more engaging, talkative and seemed to enjoy themselves during the session when they knew they were not being recorded.

Additionally, regarding the outcome of the study, the analysis of the details crafted by the co-designers reflects ways of supporting heritage exploration, privacy concerns, and considerations for authenticity, ethics, diversity and inclusive discourse.

3.3 User research synthesis

To consolidate all the data gathered from the semi-structured interviews (3.1) and the co-design workshop (3.2), a summary of the user research is presented in the following sections.

3.3.1 User needs, expectations and context of use

During the user research, it is important to understand the people involved and satisfy their needs. In these case, the users are in need of a digital tool that entices, educates and makes them reflect on heritage concepts.

The users' expectations for this product are to use this web-based digital tool in a way that does not replace the in-person experience but instead allows them to pursuit authentic heritage resources and prepares them for the critical heritage experience. Additionally privacy, authenticity, ethics, diversity and inclusive discourse are expected to be addressed in the product.

Furthermore, the users' use context for this digital tool would be to use it anywhere, at any time, making it convenient for users to access it throughout their day.

3.3.2 Personas and scenarios

User personas represent the typical users whose goals and characteristics represent the needs of a larger group. By creating a user persona, it is possible to better understand the goals and characteristics of the target audience. Keeping this in mind, meet Isabella and João.

Isabella Silva (figure 3.9) is a first-generation migrant currently living in Portugal who wants to explore the new and unfamiliar heritage of her new home without forgetting about her roots.

And João Polachek (figure 3.10), a second-generation migrant who was born and raised in Portugal who struggled during his upbringing regarding his heritage duality.

With the creation of user personas, comes the fabrication of a brief story to showcase the reason why and how would a persona use the digital tool. The following scenarios exemplify the interaction of Isabella and João with the digital tool.

Scenario for Isabella

Isabella wants to explore her new found Portuguese culture while keeping in touch with her Brazilian roots. Since arriving to her new country, she has been wondering all about the stories that intersect both cultures that now are part of her. One day she heard from a Portuguese friend about the *Migrantour's* intercultural guided tours, but neither of them had participated in one before. Isabella knows the city of Lisbon but doesn't know its history as well, so she decided she wanted to engage in one of these tours.

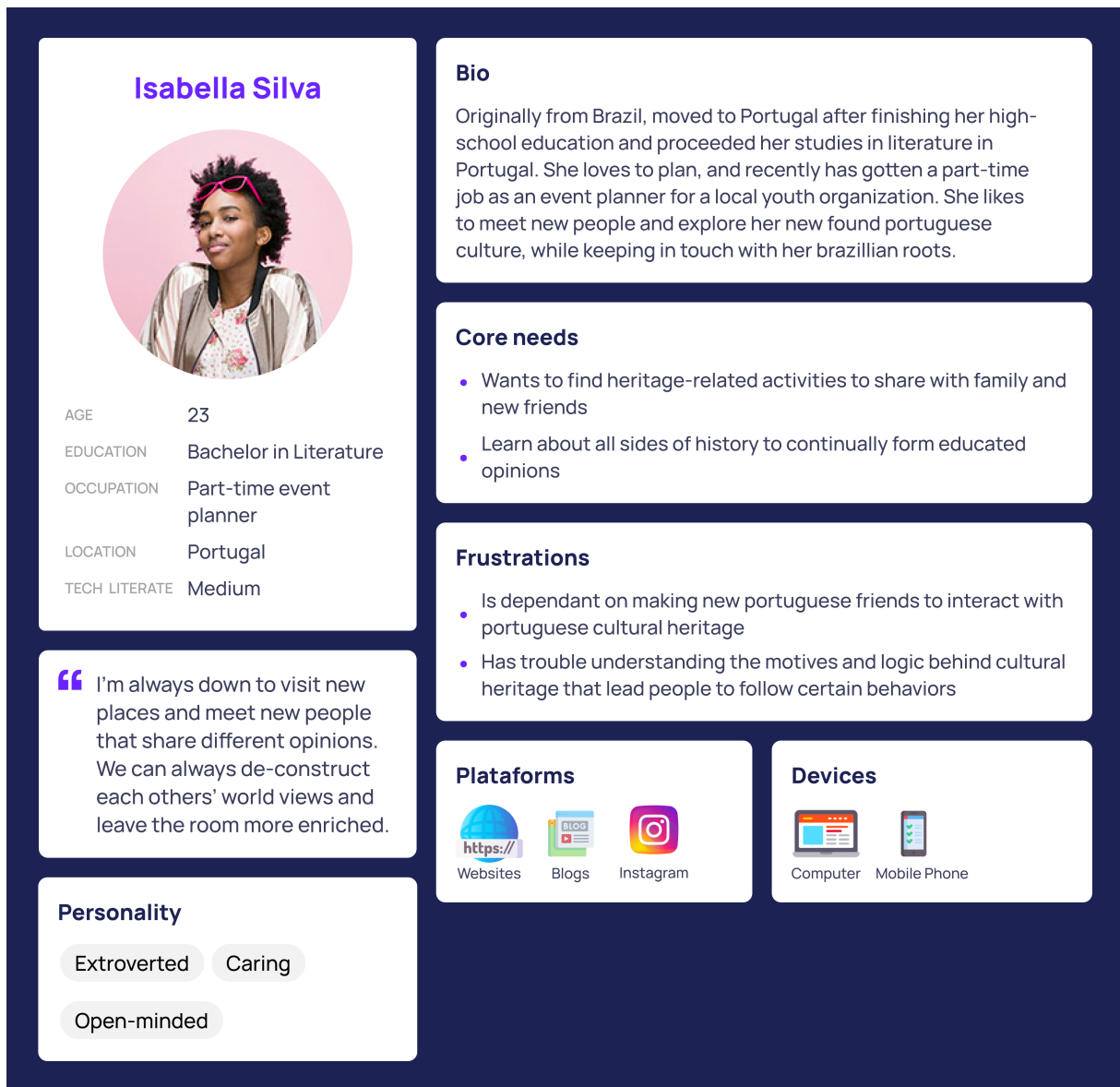


Figure 3.9: Visual synthesis introducing the first persona - Isabella Silva

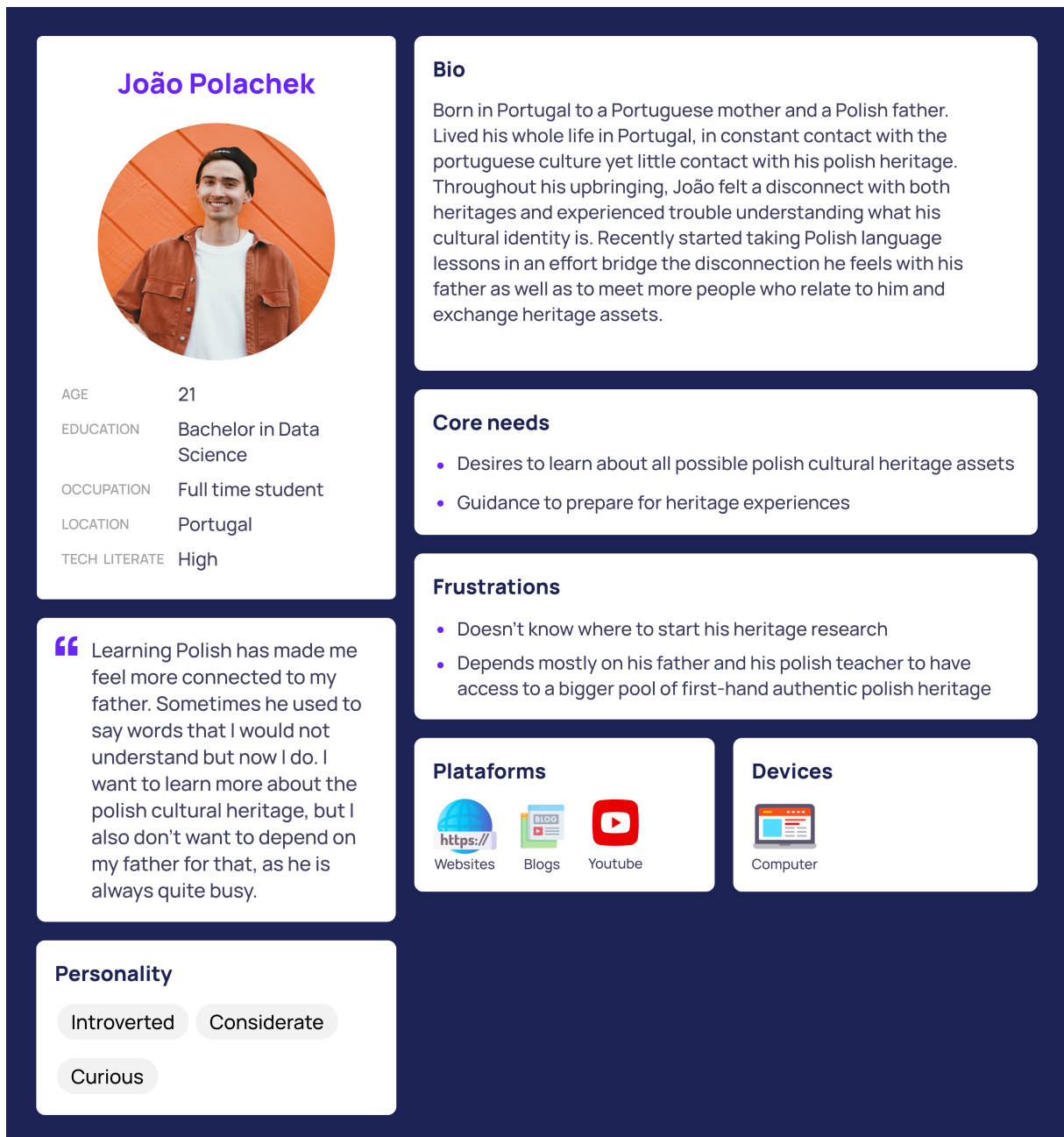


Figure 3.10: Visual synthesis introducing the second persona - João Polachek

She searched for "Migrantour" on the web browser in her computer and found *Migrantour's* website. Using the digital tool on the website, she clicked on the pins of the interactive globe around the city of Lisbon and quickly found the information regarding the tour she was looking for, as well as some advice from the tour guides to optimize the overall experience. It informs her that she will walk for 2 hours, with several stops within 10 minutes of walking, accompanied by a group of 5 people maximum, the radius of the tour with start and end points, and the respective price for the activity. Additionally, she read the intercultural guides' advise requesting the visitors to bring a bottle of water and comfortable shoes such as sneakers as they will be walking in Portuguese sidewalk ("Calçada Portuguesa"). She was happily surprised with these orientations as she would probably forget about taking her sneakers. And specially on Portuguese sidewalk, the nightmare it would've been if she took her usual platform boots. Having access to all information she could possible think of in order to make an informed decision, she decided to schedule a spot for the tour right away for the following day for her and her friend. She felt excited to participate in the critical cultural heritage activity that uses intercultural dialogues to promote reflection on heritage assets and de-construct her opinion over her new found heritage.

Scenario for João

João keeps thinking about his Polish cultural heritage and wants to explore it a little deeper, wondering what kind of tangible and intangible elements are there. But his main challenge is that he doesn't know where to start searching. His father is busy and he can't contact his Polish professor as he is on vacation. He shared his frustration with Isabella, who let him know about the newly found *Migrantour's* digital tool that lets users explore cultural heritage resources and prepare to engage and reflect on the heritage experience.

Curious, João entered *Migrantour's* website and quickly found the digital tool. With it, he started to explore the globe visualization with various pins. He located Poland in the map and clicked the pins around. He was able to explore authorized heritage and inclusive heritage that has been disregarded by the mainstream discourse but he still wants to know about. Not only he feels like he is learning about the Polish heritage but was also confronted with different views over the same heritage concepts, which made him reflect over it. Now he is feeling educated enough to form an opinion regarding certain topics of Polish heritage. Additionally, he is also feeling confident in his cultural identity as well as enticed to continue to engage with heritage and plan a trip to visit it in-person.

3.4 Design goals and implications

This section displays the main design goals and implications for design obtained from the user research.

3.4.1 Main design goals

The main design goals acquired from the user research for this digital tool focus on:

- **G1 - Usability**

Stakeholders expect to be provided with an easy to use interface of the system. The level of ease must be within reach of regular people with a low range of technological skills.

- **G2 - Costless**

Stakeholders expect the system to be free of charge to use and to sustain.

- **G3 - Maintainability**

Stakeholders expect the system to be low maintenance.

- **G4 - Discoverability**

Stakeholders expect the system to allow users to easily find what their are seeking.

- **G5 - Accessibility**

Stakeholders expect the system to be accessible to a wide range of ages. By facilitating its access and making it available to a larger audience, it is possible to ensure that the information will reach as many people as possible.

- **G6 - Scalability**

Stakeholders expect the system dynamically allow the increase or decrease of resources in the system.

3.4.2 Implications for design

The implications for design obtained from the user research consist on the following:

- **I1 - Critical heritage content**

The system must allow the upload of heritage resources based on a critical heritage approach to assist and contribute to a more inclusive heritage discourse. Additionally, they provide a more complete and accurate account on history, as well as aid the creation of more equitable policies that better reflect the diversity of the population and fight the known stigmas that exist within current society.

- **I2 - Critical heritage content management**

The system must allow the creation, edit, and deletion of the critical heritage content uploaded into the system.

- **I3 - Integration in *Migrantour*'s website**

In the context of the collaboration between *MEMEX* and *Migrantour*, the designed solution will be afterwards integrated in the website of the initiative *Migrantour*.

- **I4 - Layers**

To entice and self-prepare the future visitors of the alternative guided tours, the results from the interviews (section 3.1) suggested the inclusion of layers of information regarding the details of the heritage activity and a layer of advice containing orientations from the guides to optimized the overall experience for the visitors.

- **I5 - Relevant assets**

By interacting with a certain heritage resource, the system shall provide other relevant nearby heritage assets based on the geolocation.

- **I6 - Interactive Map**

To promote the interactive exploration of cultural heritage resources, the co-design results suggested an interactive map that allows an exploration of spacial structure and search for heritage resources allocated in the designed solution. The interactive map is meant to provide an overview of the uploaded cultural heritage resources as well as allow an in-dept understanding of where they are located.

- **I7 - Colored and shaped icons**

The interactive map must include different colors and different icons to identify the different types of heritage resources.

4

Design

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The following chapter presents the details of the design process for the digital tool resulting from the user research. This encompasses the concept, design choices, user flows, low-fidelity and high-fidelity prototypes.

4.1 Concept

The digital tool is a system that expands the authorized heritage to include inclusive heritage (see fig. 4.1). Users are allowed to explore both discourses to learn, de-construct their views and continuously form new opinions, as well as self-prepare to engage in critical heritage activities such as alternative guided tours provided by *Migrantour*.

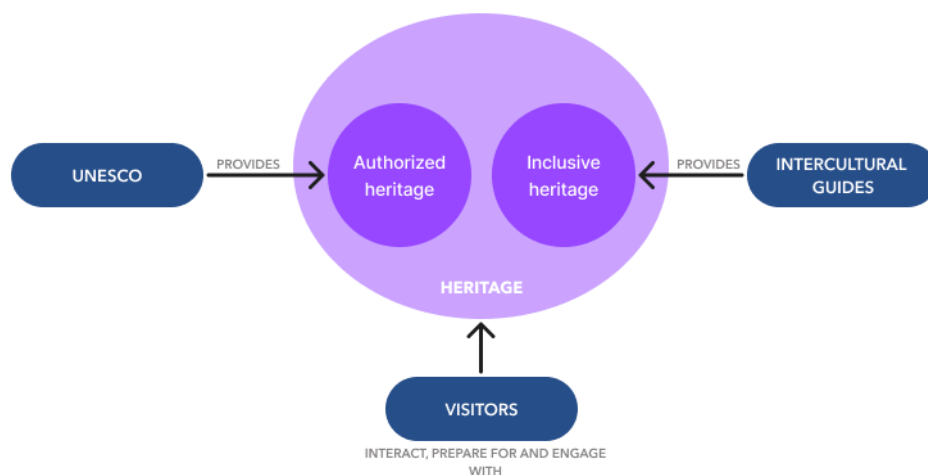


Figure 4.1: Visual diagram of the expansion of the authorized heritage to include inclusive heritage.

The system is comprised by 2 main components: a front-end component represented by User Interface (UI) available through a web browser that allows the visualization and interaction with heritage resources, and the back-end component through which the tool is connected with several Application Programming Interfaces (APIs) and allows the information to flow into the UI (see fig. 4.2). The UI through which users interact with the system is a 3D globe visualization. Users can rotate, zoom-in and zoom-out the globe. By clicking on the different colored and shaped representative icons scattered all over it, users can learn more about heritage resources that have been authorized by *UNESCO*, as well as heritage resources that have been included by *Migrantour*. Additionally, not only do users learn more about the clicked heritage resources, but are also shown its nearby heritage resources based on geographic coordinates encompassed by *Wikipedia*. This gives users a more in-depth understanding of the heritage around them. If they want to keep exploring each heritage resource, users are presented with the option to be re-directed to the resource's page in another tab.

The system encompasses two types of users: writers and visitors. The writers are established as the guides of the alternative guided tours of *Migrantour* who will produce the critical heritage content, meanwhile the visitors are designated as the future visitors of said alternative guided tours who will consume and interact with the heritage resources as explained above.

Writers can use the digital tool to display multiple layers of information about the tour, which can help visitors plan and prepare for their trip. For example, there can be a layer for the location of the tours around Europe, a layer for the information regarding the logistics of the tour, and a layer of advice each guide or city may have for future visitors and participants of the tours. There can also be a layer of accessibility to provide orientations regarding if the tour is physically demanding or if it requires certain physical abilities that may be impaired or restricted.

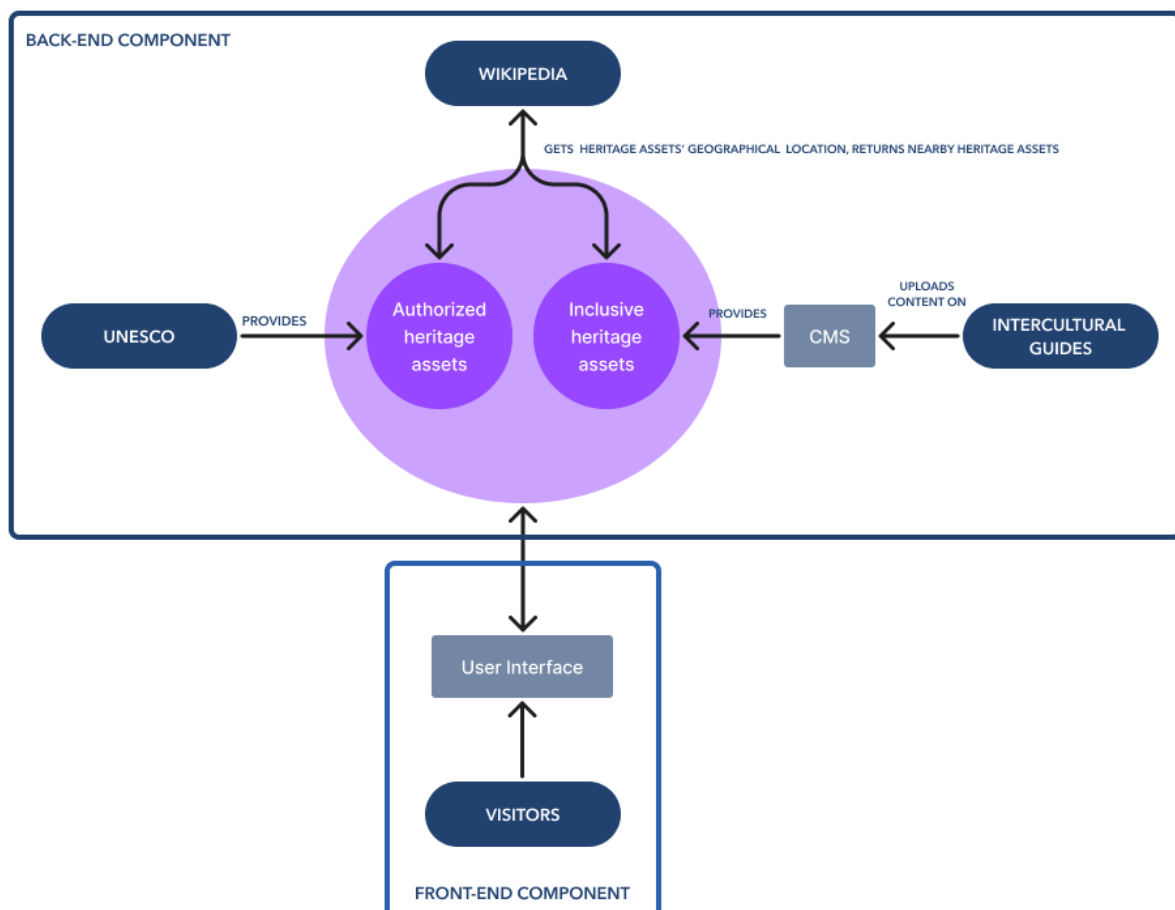


Figure 4.2: Diagram of the entities involved.

4.2 Design choices

Designing a system is a problem-solving process that aims to implement the functional requirements in section 3.4.2 while respecting the main design goals in section 3.4.1.

Taking into consideration **I3**, as currently we don't have access nor are familiarized *Migrantour's* system, all design and implementation choices are made based on the necessity for delivery and future integration with *Migrantour's* system.

Respecting **I6**, **I7**, the digital tool will include a 3D globe visualization that presents a geographical representation with different colored and shaped icons identifying the distinguishable types of heritage resources as well as its respective geographical location. The data is divided into two sources: authorized heritage resources provided from *UNESCO*, meanwhile inclusive heritage resources are provided by *Migrantour* (**I1**, **I4**). Additionally, when clicked, information regarding the selected heritage resource will be presented to the user, as well as other nearby heritage resources up to a limited distance range (**I5**).

Attending to **I1**, **I2**, and **I4**, as well as **G1**, **G2** and **G6**, the system will make use of a Content Management System (CMS) that will allow the management of the critical heritage content developed by the intercultural guides and categorization into different layers of information for the future visitors. All without having to interact directly with the back-end, but instead through a user friendly interface.

The development of this tool will consider a cost-less approach (**G2**) and low maintenance (**G3**) in which *Migrantour* will only have to populate the content management system with inclusive heritage resources, which will be automatically updated into the system. The remaining resources will be as well automatically updated according to *UNESCO's* heritage list and *Wikipedia's* documentation of heritage.

4.3 User flow

There are two different types of users for our digital solution: intercultural guides who take the role of writers, and future participants of the tour who take the role of consumers. Each type of user has a different user flow, as shown in the diagrams 4.3 and 4.4.

4.4 Low-fidelity prototype

The following stage of this process was the design of a Low-Fidelity Prototype (LFP). A LFP is a tangible artifact that is quick to design, that embodies the functionalities and how they work between themselves to simulating the flow of the final product in a very low-design level. This prototype was sketched on paper and pencil to be possible to re-design any component if needed depending on the users feedback.

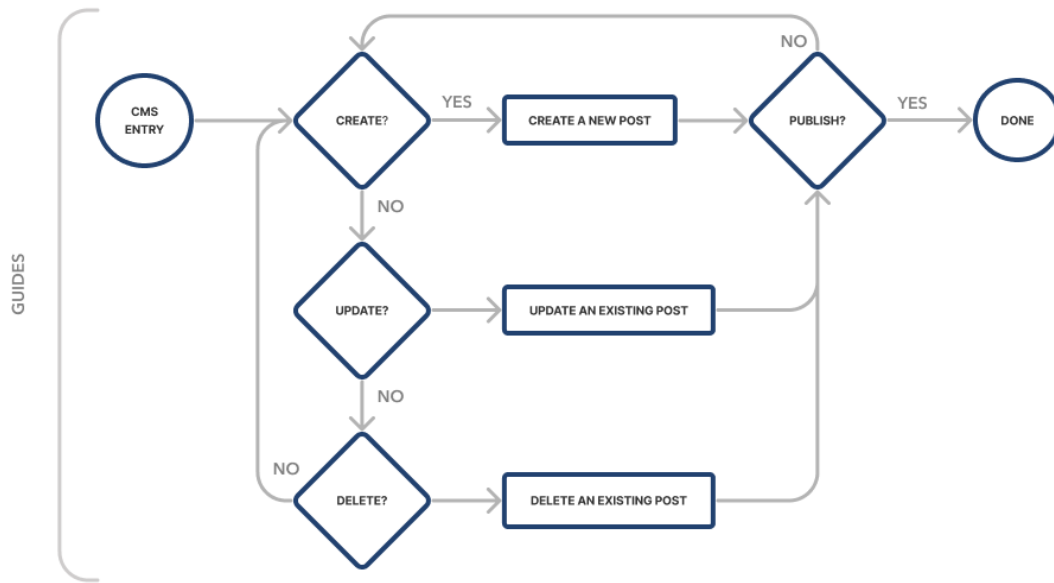


Figure 4.3: User flow of the intercultural guides.

This prototype focused on the functionalities of (1) visualization and interaction with the globe (see figures 4.5, 4.6, 4.7, and 4.8) and (2) creation and management of critical heritage content that would be uploaded through the CMS and represented on the 3D globe (see figures 4.9 and 4.10). A placeholder was created to assemble both functionalities.

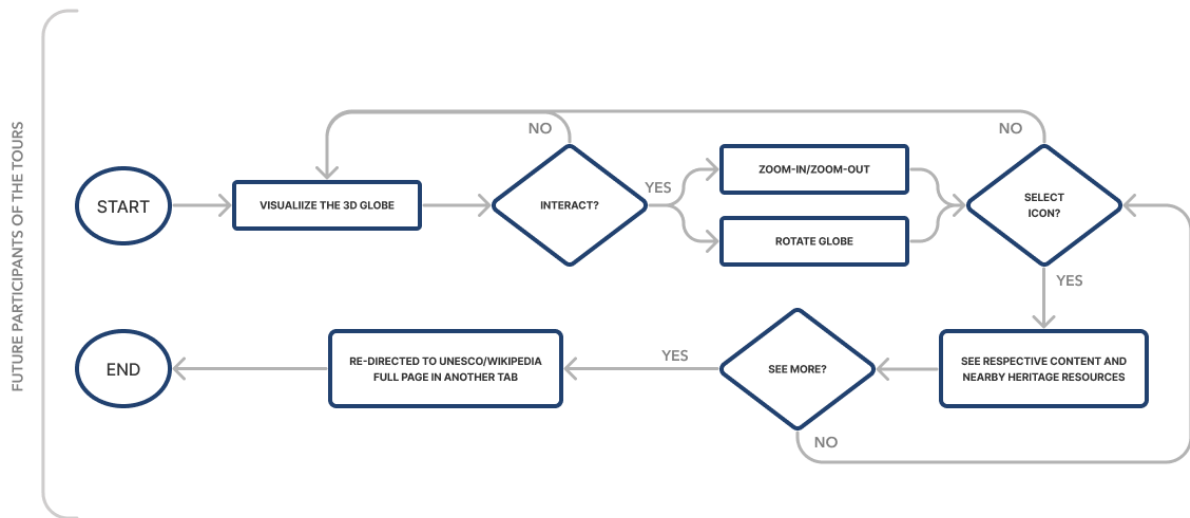


Figure 4.4: User flow of the future participants of the tour.

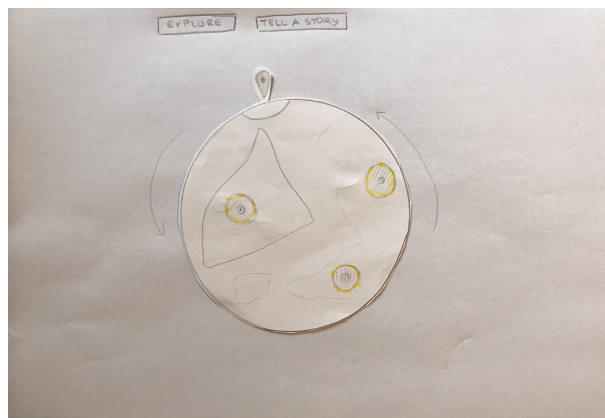


Figure 4.5: Low-fidelity prototype - A 3D globe map with user entries represented by pins. The 3D globe can be manipulated by rotating, zooming-in, zooming-out and pins can be selected.

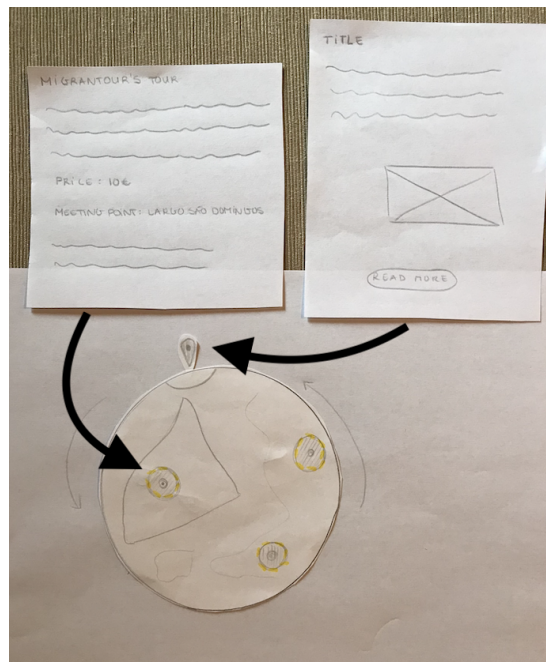


Figure 4.6: Low-fidelity prototype - When a user selects a pin, content associated with it is presented to the user.



Figure 4.7: Low-fidelity prototype - selectable pin representing the location of a content entry.

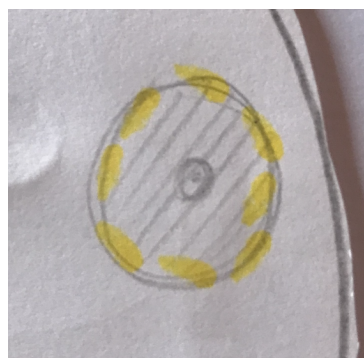


Figure 4.8: Low-fidelity prototype - selectable pin representing the location of a tour and its walking range.

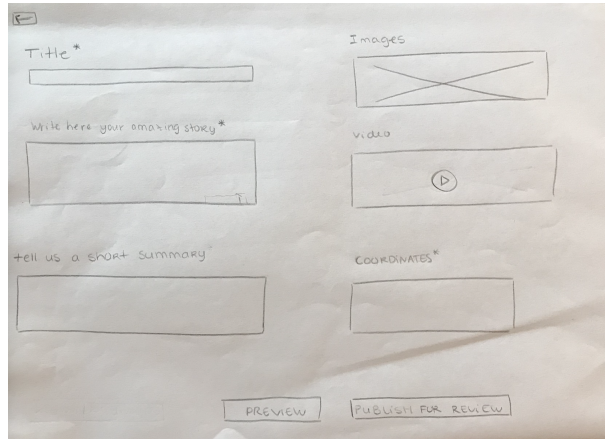


Figure 4.9: Low-fidelity prototype - Interface presented to the user when creating an entry on the CMS.

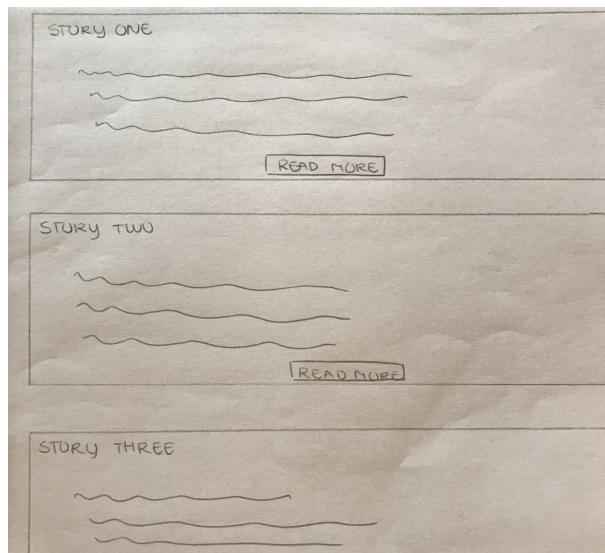


Figure 4.10: Low-fidelity prototype - The CMS interface presenting the content entries previously created by the user.

A total of 5 participants (P4, P9, P16, and 2 new participants with migratory background between the ages of 18 and 30: P17 and P18) were contacted to perform in-person individual user testing sessions. Participation was voluntary and they were not monetarily compensated.

The goal for the user testing sessions was to test the overall flow of the prototype as well as understand the participant's thought of process and interpretation for how the prototype works. For each session, the participants were presented with context of the prototype, followed by the performance of the wizard-of-oz and a think-aloud protocol, complemented with A/B testing.

Overall, participants were able to perform the required tasks with ease as well as to identify how the globe would behave if it was 3-dimensional instead of 2-dimensional as it was limited due to being designed in paper. Their feedback consisted on the following:

- On the CMS: (1) add an explanatory label to every input required in the entry interface and (2) modify the input entry layout to have all elements displayed vertically instead of horizontally;
- On the globe: (1) add an explanatory label for each representative icon.

The feedback was incorporated in next stage of iteration of the prototype.

4.5 High-fidelity prototype

A High-Fidelity Prototype (HFP) is a tangible artifact that looks and behaves the closest as possible to the final product. As our layout contains a 3D globe, the behavior of the prototype was still limited. This prototype was created using Figma¹ (see figures 4.11, 4.12, 4.13, 4.14, and 4.15).

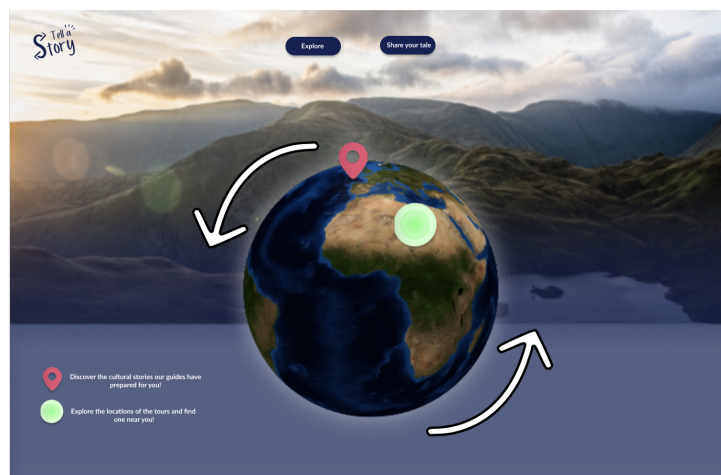


Figure 4.11: High-fidelity prototype - Placeholder interface with a manipulable 3D globe map with user entries represented by pins. The user can select a pin or create a new entry to add to the globe. The arrows were added as rotation indicators.

¹<https://www.figma.com>



Figure 4.12: High-fidelity prototype - When a user selects a pin, content associated with it is presented to the user.

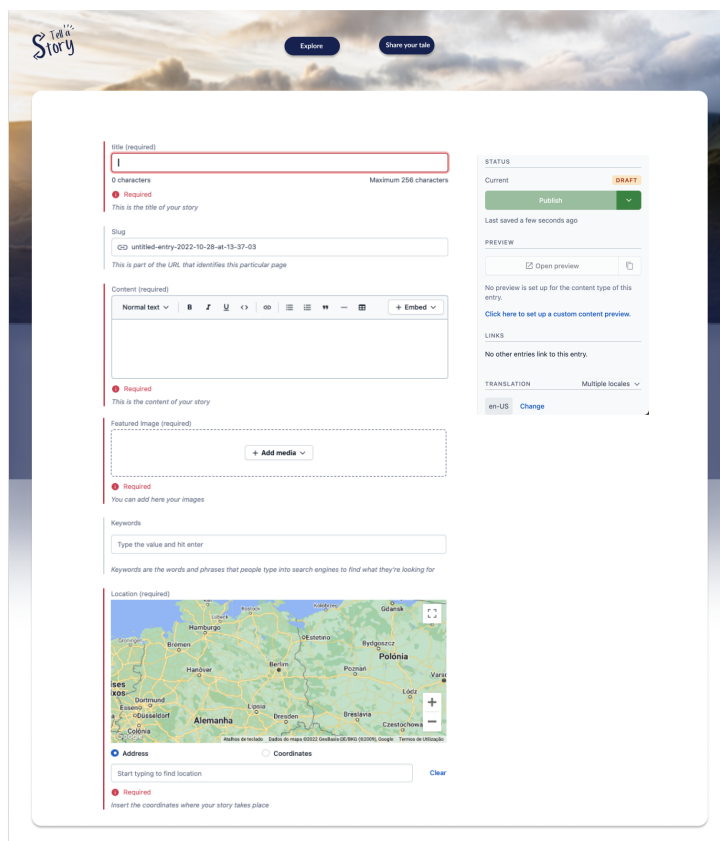


Figure 4.13: High-fidelity prototype - Interface presented to the user when creating content on the CMS. The user must insert the required information before publishing it.



Figure 4.14: High-fidelity prototype - selectable pin representing the location of a content entry.



Figure 4.15: High-fidelity prototype - selectable pin representing the location of a tour and its walking range.

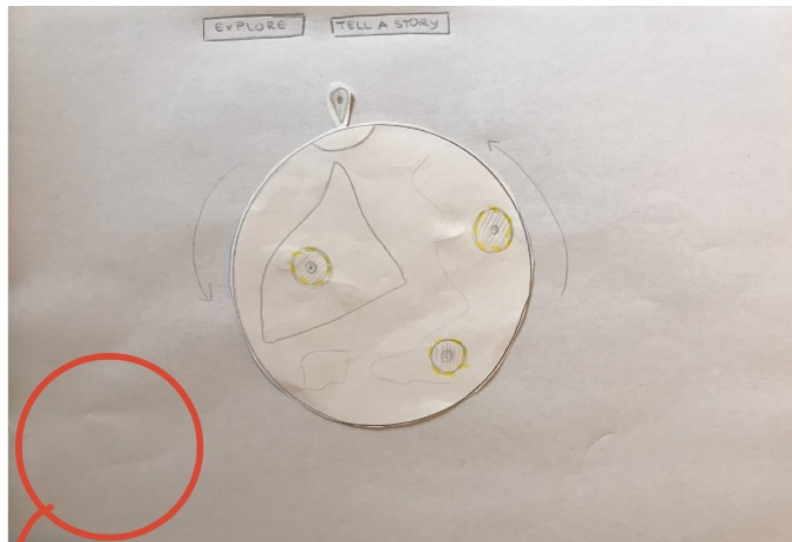


Figure 4.16: Alterations made from LFP to HFP based on the users' feedback - inclusion of explanatory label for each representative icon.

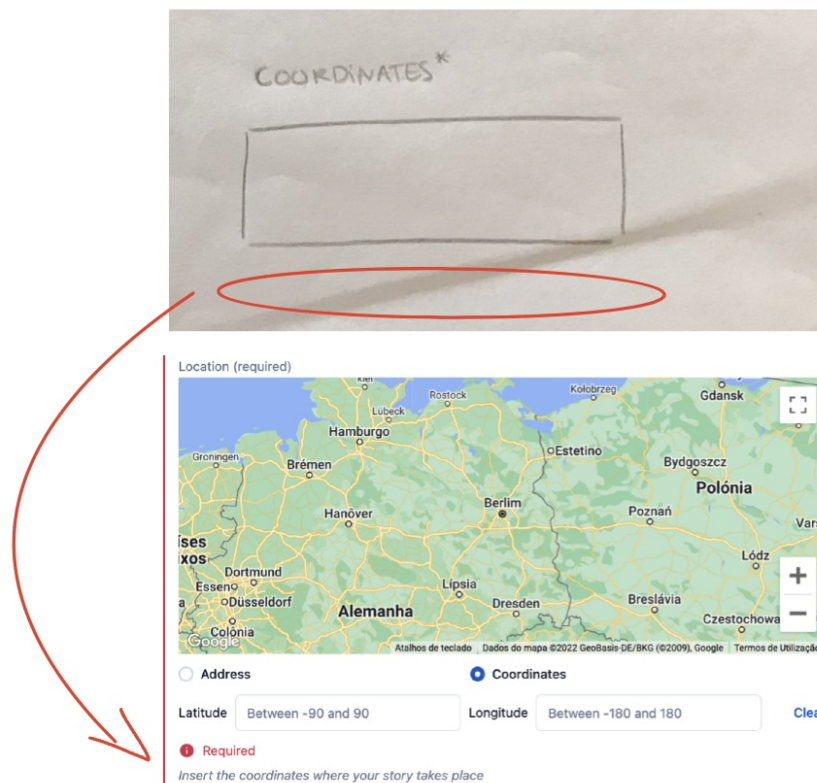


Figure 4.17: Alterations made from LFP to HFP based on the users' feedback - inclusion of explanatory label for required input in the entry interface.

As previously mentioned in 4.4, the HFP included the modifications proposed by the participants of the prior user testing (see fig. 4.16 and 4.17). Although the placeholder was not the focus of the solution design, several details were conceived and integrated into it to offer the users a more fluid experience when handling it.

Not only the digital solution was given a name, but also a logo for it was created (see fig. 4.18) using a soft font to be associated with friendliness. Additionally, a color palette was chosen around blue. The blue color chosen for the buttons and logo in the placeholder was heavily inspired by the psychology behind it. Besides representing the color of the ocean (also present in the 3D globe visualization), blue is associated with open spaces, freedom, and inspiration, as well as representing the meaning of depth, trust, sincerity, wisdom and confidence. All characteristics we aim to transmit to the user.



Figure 4.18: Logo for "Tell a Story". The 'S' in 'Story' represents a two-way arrow as the goal for the digital tool is to connect the two different heritage discourses as well as to connect both end-users.

To test "Tell a Story", 5 participants (P4, P9, P16, P18 and a new participant with migratory background aged between 18 and 30: P19) were contacted to perform individual testing sessions similar to 4.4. The user testing of the HFP was conducted with a think-aloud protocol. Participation was voluntary and they were not monetarily compensated. Users performed the requested tasks with success, and their feedback on having issues with the semantics of the language used in the prototype, namely in the CMS. This was documented and incorporated before proceeding to the next stage.

5

Implementation and Evaluation

Contents

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This chapter describes the detailed architecture, implementation, and evaluation of "Tell a Story" - a digital tool that expands the authorized heritage discourse to include inclusive heritage in a way that allows users to explore both discourses to learn and reflect on heritage concepts, in addition to prepare to engage in critical heritage activities provided by *Migrantour*.

5.1 Architecture

The architecture of the system consists of two layers: the presentation layer through which users interact with the application and the application layer which receives requests and presents the user with the requested information.

5.1.1 Application layer

The system's front-end and back-end components communicate with each other through APIs, as the information to be shown in the presentation layer is retrieved based on Hypertext Transfer Protocol (HTTP) request/response made to external resources, namely Contentful¹, Wikipedia² and UNESCO³.

5.1.1.A API - Contentful

The chosen CMS is Contentful, a content platform with an API-first architecture that allows the management of the uploaded content and can publish it to any digital channel. This allows the users (in this case, the writers) without much technology skills to easily orchestrate their uploads of critical heritage resources onto the digital tool.

To query and get the content of the CMS, it was necessary to authenticate the Space ID and the access token from the Application Programming Interface (API) keys (see fig. 5.1). All data is retrieved using an HTTPS protocol (see fig. 5.2).

```
var client = contentful.createClient({
  space: '...',
  accessToken: '...',
});
```

Figure 5.1: Authentication of space ID and access token (blurred for safety purposes).

When uploading a resource, the writers must fill in the data required such as the title, content, category, media, and coordinates they want to be associated with their heritage resource. Based on the

¹<https://www.contentful.com/>

²<https://www.mediawiki.org/wiki/API:Geosearch>

³<https://whc.unesco.org/en/list/>



Figure 5.2: Relationship between the CMS and involved entities.

category of the heritage resource given by the author at the time of the upload, it will create a new layer of information or add to an existent layer (e.g: information regarding the location of the *Migrantour's* tours, precautions to take before joining a tour, etc) and each resource will be represented with an icon representative of its category on the 3D globe in the presentation layer.

5.1.1.B API - UNESCO

To incorporate all the authorized heritage assets, an API was created to directly access UNESCO's official heritage list data in Extensible Markup Language (XML) format through an HTTP request protocol (see fig. 5.3).

The retrieved data was parsed to Document Object Model (DOM), followed by the extraction of the required data. In the presentation layer, each authorized heritage asset is represented by a circle on the respective coordinates. The colors of the circles differentiate the respective categories.

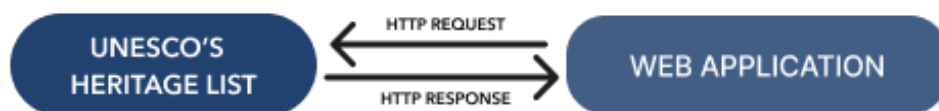


Figure 5.3: Relationship between UNESCO and the Web application.

5.1.1.C API - Geosearch

To present the nearby heritage assets of a selected pin, the application layer sends a GET request (see fig. 5.4) to search and retrieve pages from Wikipedia matching the selected asset's set of coordinates. Using the variable *gsradius*, it is possible to limit this search within a specified range in meters. Currently, the variable *gsradius* presents nearby heritage assets up to 500 meters from the selected heritage asset.

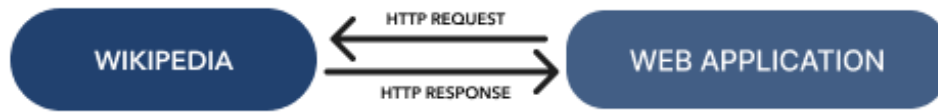


Figure 5.4: Relationship between Wikipedia and the Web application

5.1.2 Presentation layer

The presentation layer corresponds to the front-end component through which the users visualize and interact with heritage resources on a 3D globe visualization.

5.1.2.A 3D Globe

The web component describes the visualization of informational layers on a 3-dimensional globe using spherical projection created in `three.js`⁴, a javascript 3D library that allows the creation of 3D animated graphics in a browser. Using the data from the CMS Contentful as detailed in 5.1.1.A and from UNESCO as detailed in 5.1.1.B, representative pins for each source will be appended on the globe in the corresponding coordinates and when selected, the users are presented with the corresponding content regarding that heritage asset, as well as the nearby heritage assets from Wikipedia as detailed in 5.1.1.C. Jquery⁵ is used to manipulate the data retrieved and append the content onto the HyperText Markup Language (HTML) page. By clicking on the heritage asset's name, the users will be redirected in a different page to the respective page on UNESCO's website (in case the heritage element is of authorized heritage discourse) or Wikipedia (in case the heritage element is one of the nearby heritage assets).

5.2 Implementation

The solution is a web application developed in HTML, Javascript, and Cascading Style Sheet (CSS). The implementation of the system as detailed in 5.1 was separated through two iterations. The first iteration tested the feasibility of the essential mechanisms between the web application and an external resource, and the second iteration considered an improved development over the first one.

⁴<https://threejs.org/>

⁵<https://api.jquery.com/>

5.2.1 First iteration

The first iteration of the implemented prototype consisted of the development of the basic functionalities previously tested with the LFP detailed in 4.4 and the HFP detailed in 4.5. This included the implementation of the 3-Dimensional globe visualization as well its connection with the CMS.

At this point, it was possible to interact with the 3-Dimensional globe by rotating, zooming in or out, and selecting the pins (see fig. 5.5). Each pin was appended in the geographical coordinates given by the writer at the time of upload and when selected, presented the user with the respective critical heritage content, previously inserted in the system by the writers. Additionally, the pins were all in the same color and shape to any resource originated from the CMS (see fig. 5.6).

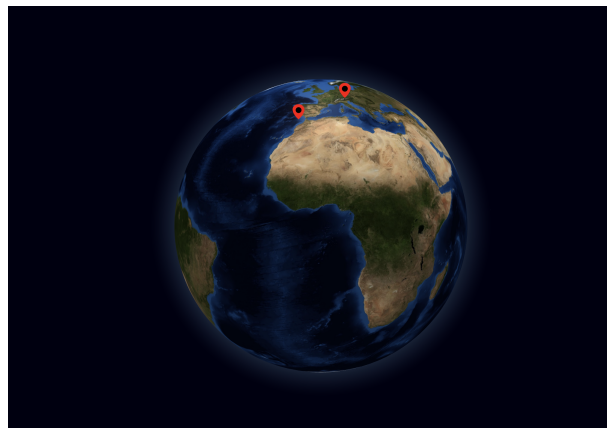


Figure 5.5: First iteration of "Tell a Story", a 3D globe visualization with red pins representing entries in the CMS - the users can select the pins to be presented with critical heritage content.



Figure 5.6: First iteration of "Tell a Story" - selectable pin representing the location of a CMS entry.

5.2.1.A Evaluation

A total of 5 users (P4, P9, P16, P18, P19) were invited to evaluate the usability of the system developed in this first iteration. This stage allows us to evaluate the system using real users to perform real tasks, to ensure that the system meets the users' needs.

User assessment

The individual user testing sessions were conducted over an online video conference platform, through which participants were given access to control the author's screen and interact with "Tell a Story". At the

beginning of each session, the participants were presented with an explanation and contextualization of the system. All users confirmed to be familiarized with maps and able to pinpoint geographical locations on a map. Afterward, they were asked to perform several tasks encompassing the critical tasks of the system, concerning the creation of critical heritage resources in the CMS as well as the exploration and interaction of the same heritage resources. The users were also requested to perform a think-aloud protocol at the same time.

When finished, the users were asked to fill out a System Usability Scale (SUS) questionnaire [38] to measure the usability of the system. The SUS questionnaire consists of 10 questions to be rated according to the user's agreement with the 5 following options: 'strongly agree', 'agree', 'no opinion', 'disagree', and 'strongly disagree'.

Discussion of Results

This study shows that users were successful in completing all tasks independently and without any issues. No problems were discovered with the system during the tests, and users were able to quickly figure out how to perform the requested tasks.

Concerning the SUS questionnaire, upon calculating its evaluation score, the system got an overall score of 92.5 out of 100. This is an excellent score as it reflects the high level of ease users use the interface of the system, consequently proving the system achieved the main design goal described in 3.4.1 as G1 - Usability.

5.2.2 Second iteration

The second iteration of the "Tell a Story" embodied the final architecture as detailed in 5.1 (see fig. 5.7).

From the work developed in the first iteration detailed in 5.2.1, the API connecting the digital tool to UNESCO's website was implemented to retrieve the authorized heritage assets. The icon chosen to represent the authorized heritage consists of a circle, inspired by UNESCO's interactive map (see fig. 2.5) detailed in 2.4.2, to which was assigned a different color to symbolize each category of authorized heritage elements: green for elements categorized as cultural heritage (see fig. 5.8, left), red for elements categorized as natural heritage (see fig. 5.8, center), and yellow elements categorized as mixed heritage (see fig. 5.8, right).

Additionally, the Wikipedia API was implemented to retrieve the nearest heritage assets of any selected element in the 3D globe visualization.

As it was previously defined that the critical heritage content would be presented through different layers of information (such as logistics of the tour, orientations to prepare for the tour, etc), categories for each layer were added on the CMS. By inserting to which category the heritage asset belongs, the

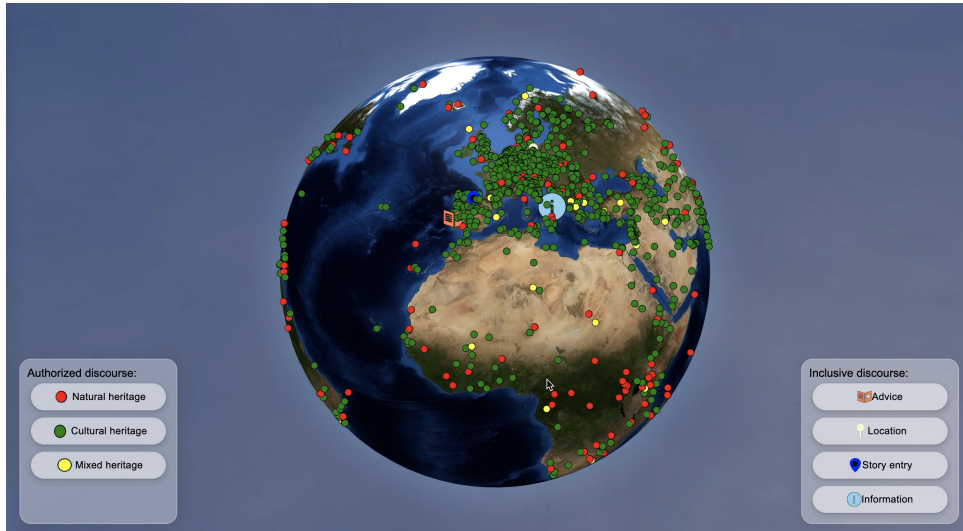


Figure 5.7: Second iteration of "Tell a Story" - dashboard presented to the users. They can interact with the globe by zooming in or out, rotating, filtering the icons accordingly to their category, and selecting the icons to be presented with information as well as nearby heritage. The color of the pin from 5.6 changed from red to blue to not cause visual conflict with 5.8 (center).



Figure 5.8: Selectable pins for authorized heritage assets used in the second iteration of "Tell a Story". From left to right: green pin representing an authorized heritage asset categorized as cultural heritage; red pin representing an authorized heritage asset categorized as natural heritage; and yellow pin representing an authorized heritage asset categorized as mixed heritage.

system will append the content on the globe with a representative icon of the category in its respective coordinates.

It is important to note that these additional representative icons were not tested with the users up to the present moment, and *Migrantour* may wish to modify them (see fig. 5.9) but they will be tested with users in a future evaluation.



Figure 5.9: Additional selectable pins for inclusive heritage assets for the second iteration of "Tell a Story". From left to right: pin representing an inclusive heritage asset categorized as important information regarding the logistics of the tours; pin representing an inclusive heritage asset categorized as advice for the preparation of the tours; and a pin representing an inclusive heritage asset categorized as the precise location of the tour.

"Tell a Story" confronts the users with the duality of both authorized and inclusive discourses, expanding the authorized heritage to include inclusive heritage and allowing users to learn, deconstruct their views and form their opinions on their own terms. They are presented with the dashboard view (see fig. 5.7) through which they can zoom in, zoom out, rotate, filter the categories for each discourse (see



Figure 5.10: Second iteration of "Tell a Story" - filtering the data to show only the elements categorized as cultural heritage.

fig. 5.10), and select the pins to be presented information (see fig. 5.11) regarding the selected asset and its nearby heritage. Additionally, users may select to be redirected to a new page containing more in-depth information regarding the selected item.

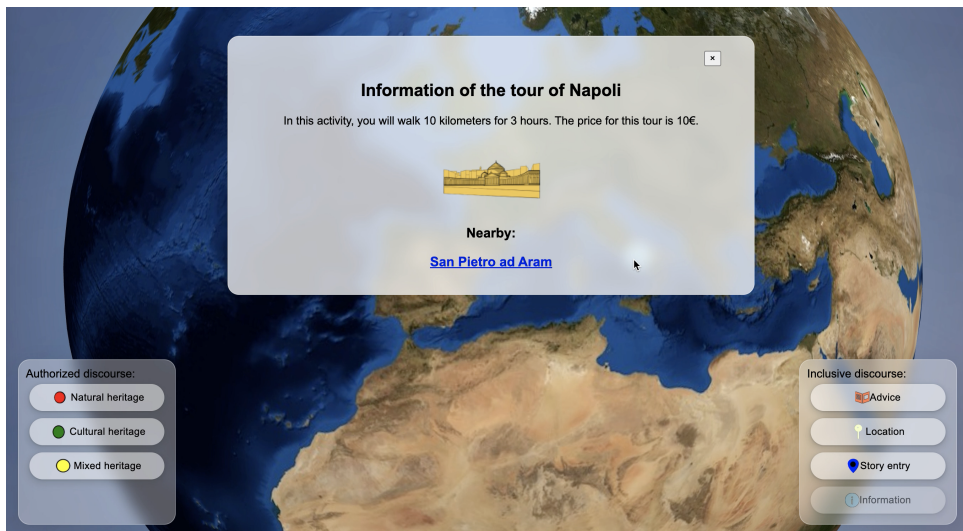


Figure 5.11: Second iteration of "Tell a Story" - information presented to the user in a pop-up form, portraying the content correspondent of the selected pin and its nearby heritage.

6

Conclusion

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This chapter presents the main limitations found throughout the process of creating and developing a digital tool for critical cultural heritage, future work needed and main contributions of this work.

6.1 Limitations

Throughout the research and development of this work several limitations were found.

The first limitation concerns the group of secondary users as it was not possible to establish contact with *Migrantour's* guides. Although the organisation was keen in conducting the collaboration, it was not possible, up to the moment, to get access to the intercultural guides to include them in the process of designing the digital tool. We tried to circumvent this limitation by focusing the user-centered process in individuals with migratory backgrounds in an attempt to understand the duality of living with multiple heritages. However, the findings resulting from the studies can't be generalized as they are limited to the current sample of participants.

Secondly, the current sample size of participants was limited, and therefore the design of this solution may not encompass further possible needs and expectations of individuals out of our sample of participants.

Additionally, further user testing using the second iteration of "Tell a Story" is needed. It is important to survey the users regarding their user experience when interacting with the final prototype, for both the possible visitors of the tour who assume the role of consumers as for the alternative tour guides who assume the role of writers.

6.2 Future Work

Taking into consideration the overall developed work, the next steps would include the user testing of the second integration of the implementation of the digital tool with the secondary users defined as the guides for the alternative tours. Their feedback is just as crucial to this process as the primary guides, as both are considered end-users of this system.

This would then be followed by possible modifications based on their feedback, as well as develop new supplementary features concerning the needs and expectations of the secondary users.

Finally, the final step would encompass the integration of the final product onto the *Migrantour's* system.

6.3 Conclusion

This work documents the process of creating and developing a digital tool for critical cultural heritage using a user-centered approach. By following a user-centered design process, we were able to create a tool that meets the needs of users and expectations, as well as involving them throughout every step of this process of uncovering **how can digital tools support alternative guided tours from Migrantour in enticing and preparing its visitors to interact and reflect on cultural heritage.**

An initial qualitative research was conducted under the project *MEMEX* with the goal to explore and understand how to design new interactive digital technologies to support intercultural dialogues. In this stage, the team of researchers engaged in alternative guided tours with *Migrantour* and *African Lisbon Tour* who provided intercultural guided urban walking tours in the city of Lisbon, facilitating the visitation and exploration of several heritage sites. The experiences were documented and analysed using a diffractive analysis throughout several workshops. The findings focused on the need to self-prepare for the experience, reflecting underlying issues concerning accessibility and inclusivity regarding the accommodation of the needs and concerns of the possible participants of the tours.

Based on the findings of the initial qualitative research, the researcher proceeded to a qualitative research study involving the possible performers of the alternative tours using semi-structured interviews with directed storytelling allied with an practical activity. Qualitative data analysis was processed on the transcripts of each interview using the Nvivo 3 software, resulting in a codebook (B). Consequently, its findings answered the research questions proposed for the study and it was possible to define a solution space, although the challenge resided in defining the details for the development for the digital tool.

To complement the previous findings, a co-design workshop was conducted to craft the details of the previously defined solution space. Using a card-sorting activity along with a MoSCow prioritization technique to uncover the co-designers mental models and manage the details for the implementation. The outcome reflected the effectiveness of this methodology.

The resulting work is a system that expands the authorized heritage to include inclusive heritage, which is an important step in promoting a more critical and reflective understanding of heritage. It consists on the visualization of globally scattered authorized and unauthorized heritage resources that when selected, provide information regarding the heritage asset selected as well as its nearby heritage assets. This allows to educate the user and promote reflection on inclusive and plural heritages. This way, possible visitors of the alternative tours are invited to explore both discourses to learn about and reflect on heritage concepts as well as plural heritages, in addition to self-prepare to engage in critical heritage activities provided by Migrantour.

Furthermore, results of the initial evaluation that tested the basic functionalities of the system allowed us to verify the high level of usability the system provides as it achieved an excellent score of 92.5 in the SUS evaluation score. Participants also expressed their interest in engaging with critical heritage

concepts.

Thus, the overall work described contributes with extensive qualitative research and methodology on the heritage field aligned with the values of HCI and a user-centered approach, that shed a light on the importance of developing tools for critical cultural heritage, and stimulates further research our findings.

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Consent Form



MEMEX

MEMories and EXperiences for inclusive digital storytelling

THEME

We are a research Team of U. Lisbon, IST asking you to participate in a research study regarding Cultural Heritage and technology. In the next sections, we will describe this study to you and will be ready to answer any of your questions. We are asking you to participate in a research study with the goal to understand how individuals interact and experience the cultural heritage, and how is it possible to create digital tools that allow the support and improve this interaction.

PARTICIPANT'S RIGHTS

During the study, the participant may leave at any point, without any personal loss.

The participant may ask questions during and after the session.

Data collected and stored by the MEMEX Project, will be duly pseudo-anonymized to ensure that the information collected and processed cannot be directly associated, or allow a direct identification, of the participants in the study.

Please keep in mind this is for research purposes and you are not being evaluated at any point.



1. SCOPE OF THE PROJECT

The MEMEX Project (*MEMories and EXperiences for inclusive digital storytelling*, Reference 870743) is developed in the scope of the Horizon Europe Programme 2020, funded by the European Commission and implemented by a consortium of nine partners, led by the Fondazione Istituto Italiano di Tecnologia, and with the Portuguese participation of the Instituto de Tecnologias Interativas (ITI/LARSyS). The Project will last for 36 months, between January 2020 and January 2023.

2. OBJETIVES OF THE PROJECT

The MEMEX Project aims to promote social cohesion through the use of a digital application on material and immaterial cultural heritage. The tools developed and tested within the scope of the Project will have the function of sharing experiences and memories in the form of stories. To achieve this objective, actions will be carried out with specific communities in Portugal, Spain, and Italy.

3. SCOPE OF THE PARTICIPATION

The participation in this activity of the MEMEX Project is free and voluntary, and participants may withdraw from it or question its continuation without any personal loss. The participants may also request information about the entities promoting the research activity.

4. CONFIDENTIALITY AND DATA COLLECTION

The Co-Design session, an action taking place in the months of May and June 2022 organized by IST, ITI/LARSyS, consists of an online or in-person session, supported by a digital whiteboard and a website (<http://www.mygrantour.org/pt-pt/migrantour-lisboa/>). These sessions aim to understand the experience of participants in the physical tours and how they can use technology as a support. Depending on the type of participant (tour guide, visitors with tour experience, and visitors without tour experience), the duration and sequence of the order of tasks are different; however, the data collection methods are uniform.

- The session for **tour guides** has an estimated duration of 1 hour, including the following order of tasks:
 - Introduction and presentation of the methodology of the activity;
 - Presentation of the sessions' theme;
 - Brainstorm activity (process of discussion and generation of ideas or problem solving) with support of maps;
 - Brainstorm activity (process of discussion and generation of ideas or problem solving) with support of photos;
 - Semi-structured interview (flexible interview model in which some questions have been formulated previously).



- The session for **visitors with tour experience** is estimated to last 45 minutes, and includes the following order of tasks:
 - Introduction and presentation of the methodology of the activity;
 - Presentation of the sessions' theme;
 - Semi-structured interview (flexible interview model in which some questions have been formulated previously).
 - Brainstorm activity (process of discussion and generation of ideas or problem solving) with support of maps.
- The session for **visitors without tour experience** has an estimated duration of 20 minutes, including the following order of tasks:
 - Introduction and presentation of the methodology of the activity;
 - Presentation of the sessions' theme;
 - Semi-structured interview (flexible interview model in which some questions have been formulated previously).
 - Brainstorm activity (process of discussion and generation of ideas or problem solving) with support of a website.

Afterwards, the participants may be invited to participate in a 20 minute online or face-to-face session to test the usability and user experience of the low/high-fidelity prototypes (preliminary and non-functional versions of computer applications). The order of tasks of these sessions will be:

- Presentation of the activity's methodology;
- Testing the prototype using "think-aloud" (the participant will describe the thinking process while completing a set of activities);
- Semi-structured interview (flexible interview model in which some questions have been formulated previously).

During the activities, the following data collection instruments are used:

- Image and sound captured during the session;
- Materials produced by the participants in the digital whiteboard during the session. This whiteboard allows the participants to upload photographs or documents.

The original data collected within the scope of the activity, as well as in its preparation (recruitment and selection of the participants) are confidential and their access is restricted to the ITI/LARSyS team. The data collected in the activity are processed and analyzed by the ITI/LARSyS team, being duly pseudo-anonymized for access to other members of the MEMEX Project, and anonymized if necessary for the purposes of supporting project actions, communication of activities, and dissemination of scientific articles regarding the MEMEX Project. The processes of pseudo-anonymization and anonymization are described in the following sections.

5. PERSONAL DATA

Among the collected data are some personal data. Data will have different treatments, depending on their future usefulness within the scope of the project:

- Data collected and deleted after the activity has ended: these data are not kept as they are only necessary for the preparation of the activity (recruitment,



selection, and communication with participants), and is not necessary to store them after the end of the activity. This personal data includes:

- First name;
- Personal cellphone number;
- E-mail address.
- Data collected and stored by the MEMEX Project, duly pseudo-anonymized to ensure that the information collected and processed cannot be directly associated, or allow a direct identification, of the participants in the study. Only the ITI/LARSyS will have access to the original data. These personal data include:
 - First name;
 - Nationality;
 - Place of residence;
 - Daily habits in the territory.

In addition to the specified data, other personal data and especially sensitive data may be also collected even when not requested. These may be collected incidentally due to the nature of the topics under consideration (heritage and cultural identity).

6. TREATMENT, STORAGE, ACCESS, AND USE OF DATA

In the scope of the Co-Design activity, the data is collected via sound and image recordings (audio, video, photography). Among these, some data will be deleted as specified in the previous section. The stored data are subjected to anonymization and pseudo-anonymization processes, to guarantee the confidentiality and anonymity of the participants:

- The documents collected within the scope of the preparation activities, submitted by the participants, are evaluated individually after the end of the activity, in which the individuals and vehicles identifiable in them are anonymized through localized blurring techniques. This action is carried out by the research team and validated by the project representatives (IST, ITI/LARSyS);
- The audiovisual recordings of the sessions are transcribed and subsequently deleted. The transcripts are subjected to a process of pseudo-anonymization, in which a code is assigned to the participants in the session, with any references to their identities replaced by the respective codes. This action is carried out by the research team and validated by the project representatives (IST, ITI/LARSyS).

The data conservation is carried out in accordance with the data policy of the MEMEX Project, which is the responsibility of IST/ITI-LARSyS, controlled by Nuno Nunes (nunojnunes@tecnico.ulisboa.pt), from whom participants can request the respective data that concerns them, or request rectification, elimination and other rights including withdrawal of consent at any time without personal loss.

The participants can also submit complaints to the National Data Protection Commission for breaches of personal data, in accordance with Article 33 of the General Data Protection Regulation (GDPR).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870743



The data will be kept for the duration of the MEMEX Project, being deleted up to 2 years after the end of the Project. Access to anonymized data is granted to members of the MEMEX Project for the purpose of supporting project actions, communication of activities and dissemination of scientific articles.

The data collected in this activity will serve to identify the application usage requirements to be developed within the MEMEX Project, related to the tools and resources needed to create narratives in a collaborative way.

7. RISK OF PARTICIPATION

There are no foreseeable risks associated with participating in this activity.



MEMEX

MEMories and EXperiences for inclusive digital storytelling

Project Representative: Nuno Nunes Valentina Nisi

Researcher conducting the study: Catarina Rodrigues

Representative Entity: Instituto Superior Técnico (IST), ITI/LARSyS

Declaration of Consent of the Participation in the Study

Original Duplicate

I, _____, resident in _____, bearer of the Identity Card / Citizen card / Passport (scratch what is not applicable) n.º _____, with validity in _____, declare that I have received an invitation to participate in this study.

I declare that I have read and understood the information contained in this document regarding the scope and objectives of the study, and I subscribe to my participation in it, within the scope of the Co-Design activity, with the commitment to participate in the collection of images and audio and participation in 1 online or face-to-face session, on ___/___/2022.

Local _____

Date _____

Signature of the Participant

Signature of the Project Representative

Valentina Nisi



B

Codebook

- ***Cultural Heritage***

- **Definition:** This code was defined as a placeholder code used to organize subcodes underneath it. It was not applied to the data but used to organize other codes such as the type of cultural heritage (tangible cultural heritage or intangible cultural heritage).

- ***Intangible Cultural Heritage***

- **Definition:** This code was defined as a placeholder code used to organize subcodes underneath it. It was not applied to the data but used to organize other codes that identify the different types of intangible cultural heritage mentioned by the participants.

- ***Beliefs***

- **Definition:** The code refers to a thought that a participant holds as true. It comprises religious beliefs, disbelief, and personal values.
- **Origin:** This code was inductive and was applied to 3 transcripts.

- **Importance:** Personal and cultural psychologies such as the participant's religion, upbringing, education, culture, or even personal values, carry a heavy weight on how individuals and communities experience the cultural heritage [39]. By understanding what drives their behavior, consequently, it will reveal what influences the interaction between the participants and cultural heritage.

- **Events**

- **Definition:** The code refers to in-person cultural social events that take place in predetermined locations gathering members of the community through ceremonies, marches, commemorations, socializing lunches, and even music shows.
- **Origin:** This code was inductive and was applied to 4 transcripts.
- **Importance:** This code encompasses a diversity of cultural events that participants have been involved in and experienced cultural heritage through them. By understanding what type of events, the importance of social gatherings within a community, and how people find community-specific events including their date and whereabouts, it may be possible to identify common methodology participants share regarding searching, learning, and experiencing heritage.

- **Gastronomy**

- **Definition:** The code refers to a diversity of cultural foods or traditional dishes participants have interacted with and have experienced cultural heritage through it.
- **Origin:** This code was inductive and was applied to 8 transcripts.
- **Importance:** This code reflects a very common way of interacting with intangible cultural heritage. Gastronomy expresses the cultural identity of a community through its preparation, sharing, and consumption. It may take the form of recipes, manners, or experiences.

- **Language**

- **Definition:** The code refers to the languages participants are familiar with or have been in contact with, as well as the adjustment process to a new language environment.
- **Origin:** This code was inductive and was applied to 3 transcripts.
- **Importance:** Communication is essential for expressing knowledge and understanding between two or more parties, as well as a common form of intra-generational and inter-generational interaction with cultural heritage. Participants shared their personal experiences when experiencing cultural heritage through a native language, mother tongue, or second language, including emotional and behavioral responses to environmental demands.

- **Music**

- **Definition:** The code refers to an interest or hobby that involves activities with traditional music.
- **Origin:** This code was inductive and was applied to 3 transcripts.
- **Importance:** Traditional forms of music carry the artistic expressions or cultural identity of a community, building an accessible bridge between cultural heritage and individuals. Participants shared different ways of embodying the experience of performing cultural activities such as music, making them feel closer to their heritage.

- **Politics**

- **Definition:** This code refers to the political and cultural environment participants have experienced in a new country during the migratory process.
- **Origin:** This code was inductive and was applied to 2 transcripts.
- **Importance:** The code refers to the participants' reflections and behaviors when experiencing a new contrasting political environment in a new country other than their native. The focus was on how they valued other cultural heritage and adaptation to it.

- **Traditions**

- **Definition:** This code refers to thoughts or behaviors inherited from previous generations that may encompass individual or collective activities such as religious practices, social customs, academic rituals, social gatherings, and even antique and complex processes such as the manufacture of linen.
- **Origin:** This code was inductive and was applied to 6 transcripts.
- **Importance:** The uniqueness and diversity of traditions gathered from each participant reflected the absence of representative stories or even acknowledgment of their heritage in today's society outside of the respective participant's community. Despite this may be justified with the small sample of 15 subjects in the study, the participants reflected on their difficulty in finding inclusive heritage resources on their own, craving for an online network of heritage diffusion.

- **Tangible Cultural Heritage**

- **Definition:** This code was defined as a placeholder code used to organize subcodes underneath it. It was not applied to the data but used to organize other codes that identify the different types of tangible cultural heritage mentioned by the participants.

- ***Buildings or structures***

- **Definition:** This code refers to the buildings and architectural structures that participants considered to be remarkable to visit and explore.
- **Origin:** This code is inductive and was applied to 2 transcripts.
- **Importance:** Although it was not a popular theme amongst the participants of this study group, it was still important to acknowledge and understand the importance of the mentioned buildings and city architectures and why have they awakened an interest in these individuals.

- ***Monuments***

- **Definition:** This code refers to the monuments that participants shared to have interest in, have visited, have memories with, and their reflections on the monuments and recent events involving said monuments.
- **Origin:** This code is inductive and was applied to 7 transcripts.
- **Importance:** The participants shared their moments interacting with cultural heritage through the mentioned monuments, with whom, and their reflections on them. The recent events involving vandalized monuments made the participants reflect on the absence of representative stories from all perspectives involved around the same concept of heritage.

- ***Museums***

- **Definition:** This code identifies which museums the participants have visited, their interested or detachment, and their experiences inside the museums.
- **Origin:** This code is inductive and was applied to 6 transcripts.
- **Importance:** This code reflects the participants' level of interest in visiting museums as a way of interacting with cultural heritage, which ones have they visit and their process of selection.

- ***Physical site***

- **Definition:** This code identifies cultural heritage in the tangible form that can be found in a specific outdoor location, the participants' experiences, and their reflections on it.
- **Origin:** This code is inductive and was applied to 5 transcripts.
- **Importance:** This code was important to the study as it identifies the participants' process of physically visit the known and unfamiliar cultural heritage in the wild, and their desire to discover more inclusive heritage stories regarding a certain heritage topic.

- ***Accessibility***

- **Definition:** This code was defined as a placeholder code used to organize subcodes underneath it. It was not applied to the data but used to organize other codes that identify the different types of accessibility mentioned by the participants.

- ***Economy***

- **Definition:** This code refers the impact economic accessibility carries in the interaction with cultural heritage.
- **Origin:** This code was inductive and was applied to 1 transcript.
- **Importance:** The participant shared the witnessed impact of the economy in the cultural heritage in the center of the city of Lisbon.

- ***Knowledge***

- **Definition:** The code refers to the interest shared by the participants in having access to the multiple perspectives, either familiar interpretations or untold stories regarding the same concept of heritage, that should co-exist officially and publicly in history.
- **Origin:** This code was inductive and was applied to 3 transcripts.
- **Importance:** Besides describing a need that participants feel and the significance for young people who wish to explore theirs and others' cultural identity, it also reflects the importance of having a form of access to this type of knowledge to do so.

- ***Physical***

- **Definition:** The code refers to the attentiveness participants shared in adjusting cultural heritage activities that may be physically inaccessible to some individuals due to old age or low mobility.
- **Origin:** This code was inductive and was applied to 2 transcripts.
- **Importance:** The cohesion and inclusion of members of communities at risk of social exclusion have been the main focus of this project. Thus, equal access and opportunities for low-mobility individuals need to be considered in the design of our system.

- ***Discomfort***

- **Definition:** The code refers to the participants' encounters with cultural heritage through which they have processed the feeling of discomfort.
- **Origin:** This code was inductive and was applied to 9 transcripts.

- **Importance:** The increasing usage of computer systems in cultural experiences has promoted new forms to design these encounters such as using discomfort to elevate the experience to a different level of intensity and memorability, that provoke reflection rather than just providing information [40, 41]. By understanding what drives participants to experience discomfort with or during their encounters with cultural heritage, it may be possible to gather insights on how to design a system that not only entertains the users but also promotes reflection.

- ***Interaction with CH***

- **Definition:** This code was defined as a placeholder code used to organize subcodes underneath it. It was not applied to the data but used to organize other codes that identify the cultural heritage experienced by the participants and the cultural heritage found by the participants.

- ***Experience CH***

- **Definition:** This code was used to organize other codes that distinguish the two forms of experiencing cultural heritage that include either experiencing it through what the participants' consider to be their own original cultural heritage or experiencing it through the interaction with other people's cultural heritage, including their reflections. The code was also applied to data identifying inclusive methods of experiencing cultural heritage enclosing direct and non-direct contact.
- **Origin:** The code was inductive and was applied to 4 transcripts.
- **Importance:** The code encompasses the approaches participants' have used to experience cultural heritage - either their own or others' - which include reading, writing, visiting, or listening to someone from said culture.

- ***Original CH - their own***

- **Definition:** This code refers to the participants' experiences and reflections on what they designate as their cultural heritage.
- **Origin:** The code was inductive and was applied to 12 transcripts.
- **Importance:** Culture is a dynamic concept that is constantly updated due to daily intercultural exchanges. As the dissemination of cultural heritage occurs, individuals may have a hard time pinpointing exactly what do they consider to be their own cultural heritage. This code contemplates what the participants consider to be their cultural heritage, how and why they adopt new cultures, as it reflects their cultural individual or community identity.

- ***Others' CH***

- **Definition:** This code refers to what participants considered to be other communities or individuals' cultural heritage, their reflections on experiencing it as well as the similarities or dissimilarities between others people's cultural heritage and the participant's own cultural heritage.
- **Origin:** This code was inductive and was applied to 8 transcripts.
- **Importance:** This code reflected how the participants perceive others' culture, the value they give to it, and their behavior towards it.

- ***Finding CH***

- **Definition:** The code reflects different methods and processes the participants follow to find cultural heritage resources.
- **Origin:** This code was inductive and was applied to 13 transcripts.
- **Importance:** This code allows us to understand how to participants search to interact and experience cultural heritage. By understanding how the participants do so and what methodologies they prefer, it can be possible to build a system that aims to satisfy their needs, entertain them, and enlighten them as well as upgrade their encounters with cultural heritage.

- ***Intercultural Dialogues***

- **Definition:** This code reflects the moments that have led participants to experience intercultural dialogues, the moments themselves, and their reflections on them.
- **Origin:** This code was inductive and was applied to 7 transcripts.
- **Importance:** The code was important for the study as it allowed us to understand in what context the participants experienced intercultural dialogues, its impact on the participants' perception of heritage, the nature of said interaction (if happened naturally or forced), and what are the intrinsic goals for this exchange.

- ***Sharing stories or CH***

- **Definition:** This code was defined as a placeholder code used to organize subcodes underneath it. It was not applied to the data but used to organize other codes that identify the different methods used by the participants to share stories regarding cultural heritage or share cultural heritage resources in some way.

- ***Share content***

- **Definition:** This code refers to the different forms of sharing content concerning heritage resources favored by the participants.
- **Origin:** This code was inductive and was applied to 10 transcripts.
- **Importance:** By understanding how and why participants prefer to share stories or cultural heritage resources in the form of content creation and consumption, these multimedia configurations may be considered for the system. The code encompasses online and in-person sharing content context such as videos, images, text, presentations, audience engagement, short interesting facts, and storytelling.

- ***Social Interactions***

- **Definition:** This code refers to the participants' most recent, preferred, or remarkable interaction with cultural heritage resources that occurred through social interactions.
- **Origin:** This code was inductive and was applied to 10 transcripts.
- **Importance:** The code was important for the study as it exposes one way participants have engaged with cultural heritage resources, as well as a way to promote the engagement with their respective cultural legacy but also with the heritage of others. By understanding the weight social interactions has in the interaction with cultural heritage, the digital system design can be adjusted to these needs.

- ***Social media or online***

- **Definition:** This code refers to the participants' processes and methods concerning sharing stories or cultural heritage resources with other people through social media or other online platforms.
- **Origin:** This code is inductive and was applied to 7 transcripts.
- **Importance:** The code helps us understand what online platforms do participants use to share stories or cultural heritage, how do they use said digital tools, and what purpose does each platform fulfill. Although the usage of social media could be considered as an online social interaction, some participants explained using social media not as a social tool but as reading material without performing any interactions with resources nor other members of the social network in question, differentiating this code from ***Social Interactions***. This concept comprises the usage of google, forums, blogs, Instagram, Messenger, Whatsapp, Twitter or Reddit.

- ***Social Group***

- **Definition:** This code was defined as a placeholder code used to organize subcodes underneath it. It was not applied to the data but used to organize other codes that identify the different types of social groups with whom the participants interact and experience cultural heritage.

- **Family**

- **Definition:** This code reflects the participant's interactions and experiences with cultural heritage that involved their family.
- **Origin:** This code was inductive and was applied to 10 transcripts.
- **Importance:** The code helps us understand the weight the concept of family has in the participant's life and its impact in their interaction with heritage. Family, as part of the participant's social groups, carry a heavy significance in how the participant's live their life, how they perceive heritage and how the legacy of heritage is carried onto the next generation.

- **Friends**

- **Definition:** This code reflects the participant's interactions and experiences with cultural heritage that involved their friends.
- **Origin:** This code was inductive and was applied to 6 transcripts.
- **Importance:** The code helps us understand the weight the concept of friends has in the participant's life and its impact in their interaction with heritage. Friends, as part of the participant's social groups, carry a heavy significance in how the participant's live their life, how they perceive heritage and how the legacy of heritage is carried onto the next generation.

- **Interest in Tour**

- **Definition:** This code was taken into consideration for the context of the collaboration between MEMEX and Migrantour, and portrays the participants interest, views, and reflections in performing a specific outdoor cultural activity associated with the migrant community.
- **Origin:** This code was deductive and was applied to 13 transcripts.
- **Importance:** Considering the collaboration between MEMEX and Migrantour, it's necessary to understand the participant's interest in performing the service that Migrantour has to offer, as well as their viewpoints and reflections on the matter and what would entice them to participate in the tour activity.

- **Website Experience**

- **Definition:** This code was defined as a placeholder code used to organize subcodes underneath it. It was not applied to the data but used to organize other codes that identify the different topics of feedback transmitted by the participants during the website activity.

- ***Tour Missing Details***

- **Definition:** The code refers to the missing details participants felt crucial to have clarified before committing to performing Migrantour's cultural activity.
- **Origin:** This code was inductive and was applied to 15 transcriptions.
- **Importance:** Considering the collaboration between MEMEX and Migrantour, it's necessary to understand how was the participant's experience when browsing through Migrantour's website, and how could this experience be improved. The tour's missing details such as the duration, price, walking distance, clothes and footwear recommendations, route, or even in what language will the tour be given in, etc., were decisive facts that took a heavy weight on the participant's decision to commit with performing the tour. Thus, by addressing these details, the audience engagement with Migrantour's service will increase.

- ***Website improvements***

- **Definition:** This code gathers the improvements that need to be done on the website to enhance the user experience, transmitted by the participants during the session.
- **Origin:** This code was inductive and was applied to 11 transcripts.
- **Importance:** The code refers to indispensable improvements that will entice the users to interact with the website, the tour, and other heritage resources, as well as improve their experience.

