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A Framework for Stakeholders' Involvement in Digital Productions for Cultural Heritage Tourism

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Abstract: This paper proposes a new framework for the production and development of immersive and playful technologies in cultural heritage in which different stakeholders such as users and local communities are involved early on in the product development chain. We believe that an early stage of co-creation in the design process produces a clear understanding of what users struggle with, facilitates the creation of community ownership and helps in better defining the design challenge at hand. We show that adopting such a framework has several direct and indirect benefits, including a deeper sense of site and product ownership as direct benefits to the individual, and the creation and growth of tangential economies to the community.

Keywords: cultural heritage digital productions; stakeholders' involvement; community participation



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1. Introduction

Recent literature on cultural heritage [1] emphasises the necessity to involve local communities in managing, planning, and preserving the local cultural heritage, as only by recognising the cultural heritage values, local communities can express and raise awareness of its meaning and importance to them. Evidently, the feeling of ownership and of proudness that they develop in this way is further reflected in a sense of responsibility for the heritage itself, regardless of its nature as tangible or intangible. A way to achieve this as Houpert [2] draws from the ROCK experience, is through the adoption of participatory approaches and the promotion of social inclusion of the civil society in its broadest meaning in the development of heritage interventions, also when these are digital. The author stresses the importance of the 'bottom-up' approach for the sake of adding ownership over the governance of an area, and as a result of promoting the engagement of local communities in the preservation of their local heritage.

Cultural heritage (CH) is not static but fluent in the transcends of time and space and can be viewed through different lenses beyond 'conservation', for example as an 'enabler of economic, social or sustainable growth' (as in, for example, [3], among others) in which everyone is a stakeholder. When it comes to digital cultural heritage productions, involving such a broader range of stakeholders in their co-creation is paramount if one wants to achieve this same sense of ownership, belonging and responsibility with respect to heritage that the literature on CH speaks about [4]. Such a more inclusive and co-creative approach to digital development will not only create awareness of local heritage services and processes but will also facilitate an innovative culture around such heritage, help support economic growth around it to reduce unemployment and enable the social inclusion of minorities [1,2,5]. Providing the local people a voice through digital mediation, for example

by letting their stories related to a specific heritage site be told or by reinterpreting it through the lens of their cultural perspective, help address vulnerabilities that might be rooted in political decisions, social systems, or unequal distribution of power. Additionally, a digital multimedia content development that is intrinsically co-creative and participative stimulates new forms of collaboration between public and private entities. Finally, it establishes and disseminates new skills, and reduces entry barriers to technology developments and adoptions [5,6].

Cultural heritage sites provide a great playground to develop digital multimedia using immersive technologies such as augmented reality (AR) [7], virtual reality (VR) [8,9], or serious games [10–12]. Heritage sites have been represented in games and other multimedia for a long time, to engage visitors into interactive on-site experiences, like historical reconstructions that can be educational or can help raise awareness around that site or to promote the importance of cultural heritage among visitors [11,13] by fostering cultural understanding. To develop such technologies, a variety of content and technology experts are involved to deliver a true and authentic digital cultural heritage experience to the end users. However, in the literature, we only find examples where these experts often do not extend beyond the formal executive circle of heritage officials, historians, tourism representatives and technology developers while end users or the local community are only involved in the evaluation or testing phase [14–16] instead of being considered as an important player throughout the whole digital cultural heritage production cycle. The fact that the end user for whom the digital content is intended, be it the tourist or the local, is often not incorporated in the development process, makes it difficult to motivate acceptance and final usage of the product, make believe of the content once developed and, even more importantly, to create ownership on it (as in [4]).

This article claims the need to engage local stakeholders and communities into the digital production of cultural heritage platforms, applications and (serious) games for tourism and educational purposes since the start of the design process to allow for a sense of ownership and awareness for cultural heritage as a form of grassroots digital technology development approach.

Expanding on the traditional role of institutionalised heritage and cultural education, this article suggests inviting end users, local communities, and out-of-industry stakeholders during the digital content development process to create grassroots ownership on the cultural heritage sites. We review a variety of participative approaches of technology development like human-centred-design (HCD) rooted in software engineering [17], player-centred game development [18], or Situated Play Design (SPD) introduced by Bertram et al. [19]. All these approaches integrate a variety of stakeholders into the development process from investigation to design, prototyping, and development. Eventually, the connection to the user and stakeholders is not continued until after the launch in Living Labs [20] and in forms like the ‘participative museum’ advocated by Nina Simon [21], soliciting the involvement of all local communities to produce (digital) products that drive the force for creative work. This will elicit new creative energy by engaging a vast variety of stakeholders beyond the cultural circle to empower urban generation and resilience building, cultural preservation, sustainable development, and innovation facilitation [2].

To respond to the above needs, we present a framework on whom, when and how to involve into the production process of digital multimedia in a cultural heritage context. We leverage the experience gained from the many applications we have developed to assess the advantages and disadvantages of the different framework architectures in order to propose the most promising approach.

2. Related Work

In this section, we present a literature overview of related work in the field of content creation in cultural heritage. This overview includes a description of stakeholders’ involvement in cultural heritage, a definition of what is understood under ‘participation’ and a discussion of what communities are in relation to heritage and to these participatory

practices, the role technology plays in it and the challenges it presents. We close this section with a justification for the need of a new co-creative framework.

2.1. Stakeholders' Involvement in CH

There is no common definition of a stakeholder theory yet [22]. Originally coined by Freeman in 1984, a company's stakeholder can be classified as internal (as in the case of the employees, the managers or the company owners) and external (like the suppliers, society at large, the government or the clients) [22]. McCabe et al. [23] define a stakeholder as any group or individual who has 'a legitimate interest in the organisation or its activities'.

Stakeholders need to be managed to maximise a shared vision, representation, the achievement of objectives, communication, and a good working relationship [23]. In Western countries, since the 1970s, state interventions were transferred to stakeholder responsibility, where collaborative partnerships of planning and development were established [23]. In particular, stakeholder collaboration became important for tourism development [24]. McCabe et al. [23] distinguish between collaboration for planning and development processes and collaboration for marketing purposes, so anyone who can call themselves a 'stakeholder' can contribute to the achievement of the organisation's objectives. However, there exist several barriers to stakeholder collaboration, including the will to maintain control on the collaboration by one of the involved stakeholders, or the lack of coordination and of a collaborative mindset or of trust and goodwill among them, which may even result into competition among the stakeholders, or the lack of private sector involvement [23].

Generally, the streams of research on 'cultural heritage', 'stakeholders' involvement' and 'digital production' are dealt with separately, or only one interrelation between two fields are researched. Serravalle et al.'s analysis [25] of the interrelations between tourism management, stakeholders and digital innovation and their contribution to co-creation is one exception to this, and has the closest relation to this study. As digital development projects are expensive to fund and require a diverse range of expertise (see further), innovation processes are open for external stakeholders to engage in a co-creative value creation [25]. This is why the adoption of participatory approaches to it becomes essential.

2.2. The Need for Participation in CH

Participatory approaches became mainstream in heritage practice with the 2003 UNESCO Intangible Heritage Convention, and in particular its Article 15, which states that 'within the framework of its safeguarding activities of the intangible cultural heritage, each State Party shall endeavour to ensure the widest possible participation of communities, groups and, where appropriate, individuals that create, maintain and transmit such heritage, and to involve them actively in management.' (ich.unesco.org (accessed on 2 October 2020), reported in [26], p. 10). While the focus of Article 15 is specifically on intangible heritage, it is evident in daily practice that the same approach to involve local communities is used when it comes to cultural heritage *tour court*, so also tangible heritage.

This became a well-known and accepted practice since Nina Simon's seminal book and experience on the participatory museum [21]. In partnership with local schools, businesses and community organisations, Nina Simon came up with the idea of the 'pop-up museum' at the Museum of Art and History (MAH) in Santa Cruz (CA, USA), where museum content is co-created [21]. The pop-up museum is a temporary exhibit created by the people who show up to participate. It consists of choosing a theme and venue and then calling on people to participate by bringing an object related to the chosen topic to share. Participants write a label for their object and leave it on display. The venue can be very diverse: from the museum space itself to unorthodox, non-museum spaces, such as bars, churches, and public spaces. The museum is based solely on the content (both as objects and stories) provided by the people making up the show. And its main goal is to facilitate a dialogue among individuals, those who expose and those who come to look at the exhibit, and in this

way to stimulate sociality and learning and to foster inclusivity outside of the often-rigid walls and spaces of the museum.

A more recent example of community involvement in tangible heritage is the city museum in Lier, a small town in Flanders (Belgium). The museum opened at the end of 2018 without having an own collection and with the ambition of becoming a museum ‘for the Lierenaars by the Lierenaars’ (SmartCulTour D3.1 deliverable, 2021): their main focus was on the city itself by telling the stories of its residents. In order to realise this, in 2015, the museum asked the Lier citizens what they recognised as typical features of their own town. The local community steering committee worked for one year on this and ultimately, they put together the museum’s new collection, by collecting and exposing the artifacts that were indicated by the local residents. This collection therefore reflects their own values and mirrors the identity of the city in a more authentic way.

This last example shows the effect of adopting a participatory approach to cultural heritage in making a museum socially relevant. Its relevance depends on the fact that any social group is welcome and should feel welcome and can as such engage in a dialogue with other people and social groups inside the museum space, but also with the museum staff themselves, and with the collection. If a museum is perceived as relevant by the locals because it reflects their voices and identity, they feel that they can find in it more of the way they live in the city and of the city itself—so, they feel represented, because they recognise their own values in it. In this way, the museum becomes more inclusive, too.

Both examples reported in this section highlight the importance of engaging the local community in determining what heritage is for them and also which form this engagement may take.

What communities are and in which way they can be engaged in heritage is what still needs to be further elaborated upon.

2.3. Communities and Their Participation in CH

Communities are broadly understood as a network of ‘connected, informed, empowered, and active consumers’ ([27], p. 8). However, in the specific context of CH, communities are defined by Article 2 (b) of the 2005 Council of Europe Framework Convention on the Value of Cultural Heritage for Society, the so-called Faro Convention, as either *heritage communities* or *communities of practice* [26]. Heritage communities are broad and heterogeneous communities of ‘people who value specific aspects of cultural heritage which they wish, within the framework of public action, to sustain and transmit to future generations’ ([26], p. 13). The Lier community of the example discussed earlier is one such community. A narrower version of it is a community of practice, which includes only those who ‘are directly and actively involved in the practice of cultural expressions’ ([26], p. 13). This focus on the practice makes it mostly related to intangible heritage and its expressions in oral traditions, music, and dance, for example [26].

According to both definitions, a community is an entity with a collective character whose sense of identity and belonging emerges when sharing a heritage site or practice that they wish to preserve and transmit to future generations [26].

To safeguard it, they need to act collectively, through various forms of participation. These can be, for instance, consultations through public meetings or within living labs, debates, workshops, calls for actions or interventions, all relying on the community’s and practitioners’ involvement [26]. This implies recognising, accepting, and fostering the intrinsic diversity of those involved to promote a dialogue around the heritage [26].

To cater for this dialogue and diversity, Pera et al. [28] developed a multi-stakeholder co-creative model that relies on the notion of a stakeholder eco-system. At the heart of it, providing reasons why stakeholders collaborate, the authors distinguish between motives and resources. Motives include things such as reputation enhancement of the eco-system that will also reflect on the individual stakeholder, the desire to experiment in developing new products that are only possible through the synergy among stakeholders, and the desire to develop new collaborations and extend their own network to other players and

audiences [28]. This requires the existence of trust within the ecosystem, and an open and inclusive mindset.

Alignment among stakeholders is not necessarily the most desired outcome of co-creation, as diversity lies at the heart of it: 'a polyphonic multi-stakeholder co-creation is built upon diverse identities' [28], each maintaining their own uniqueness as opposed to introduce consistency, unity with own agendas, tensions, and opposing values.

2.4. Challenges to Multi-Stakeholders Heritage Productions

Technology can facilitate stakeholders' involvement in co-creation processes. tom Dieck & Jung [22], for example, discuss how the adoption of augmented reality in a small British museum has enhanced it for both the internal and the external stakeholders (see above). Its value to the process has taken different forms that ranges from an economic value (to attract new audiences) to an experiential one (to offer meaningful and memorable experiences) and an epistemic value (to entice the audience by triggering their curiosity). The historical and cultural, the educational, and the social values that complete the spectrum of benefits of the use of technology for stakeholders' involvement [22] deserve a special attention in the context of the present discussion as they impinge upon the role of co-creation that is advocated in this article: that of recognising and making others recognise the intrinsic historical and cultural importance of certain heritage artefacts, of teaching something new to their audiences of various stakeholders, of facilitating sociability and of supporting intercultural dialogue through sharing experiences and content.

This is therefore an argument in favour of multi-stakeholders' digital heritage productions. There are however still a few challenges to face.

One of the main challenges to implementing the multi-stakeholders' co-creative dialogue discussed so far is the strong influence that the traditional 'authorised heritage discourse' maintains. This discourse supports the idea that only experts and the academy have the authority to define what heritage is, the right to produce knowledge around it and the power to implement measures to protect it [26].

However, from literature, we know that opening up this process to more stakeholders (and not just to the communities, as mentioned so far) and involving them in this process offers many advantages. For example:

- When employees are one of the stakeholders, it fosters ownership, promotes creativity and contributes to the competitiveness of the organisation [29].
- When tourists are involved, their point-of-view becomes essential to ensure a strong focus on the resulting (tourist) experiences [23,30].
- When technology is involved, it ensures its adaptability among all stakeholders since they can jointly decide if a technology is worthwhile implementing.

Ideally, it would be therefore important to develop a workflow whereby collaboration among different stakeholders is fostered in the various stages of the production process, achieving a balance between the participation of the communities and other 'end users' (like the tourists and visitors) and, simultaneously, the experienced work provided by the technical and scientific stakeholders. And at each stage of the production process, different co-creating methodologies should be used. For example, in an initial diagnostic or interpretation phase, public consultation is needed, and this could even be performed through online systems. In the ideation phase, the use of more interventional techniques may be justified, with communities and 'end users' actively participating in the decision-making process. Before the implementation phase, it may be important to organise capacity-building actions. Throughout the whole process, it would be highly relevant to combine the actions planned with observing practices in situ.

2.5. Conclusion

To conclude, our focus and the purpose of this article is to consider the new opportunities provided by digital technologies where collaboration and integration of new

stakeholders is important: stakeholders hold resources, not only financial ones but, *in primis*, expertise, skills and experience [4].

The present overview of issues related to stakeholders' involvement in heritage practice has shown that integrating different stakeholders in the development of digital production processes overcomes knowledge/learning barriers [23] and the risk of developing inappropriate or unsuitable technologies. This further results in minimising (production) costs and increasing efficiency in development [25].

3. Background on Different Stakeholder Integration Methods

In this section, we present the diversity of stakeholder participation methods used to evaluate or identify the adaption rate of new and disruptive technologies, as well as their involvement at the implementation stage. The development of new interventions needs the involvement of a diverse number of stakeholders to ensure a co-creative process that creates agency and accountability.

3.1. Approaches to Stakeholders' Integration into the Design Process

The software and game design process draws on the concept of iterative practices, using user feedback to inform the design of the product. In this way, the product ought to be closer to the end-user and community in which it is implemented. Table 1 provides an overview of the most common participation methods used for IT (immersive AR/VR/XR technologies) and game development.

Table 1. Overview of stakeholder participation methods.

Stakeholder Participation Method	Reference	Description
<i>Player-Centred Design</i>	[18]	Based on the human-centred design process (ISO 13407), PCD was developed to include preferences, needs and motivations of players. Self-referral during game development may become a dangerous and costly approach during serious game design, especially when game developers are developing a game for minorities and people with special needs or different ethnicities or cultural background. The P-III process provides a framework for player-integration into the design process. However, it does not touch upon the integration of external stakeholders.
<i>Participatory Design (PD)</i>	[31]	PD is a Scandinavian design methodology in HCI using prototypes and workshop formats to develop user-centred IT products. It is based on the belief that design is socially organised and contextualised in which skills and technology change depending on the task of the user. Thus, the user/stakeholder has knowledge to pass on to the designer. This may potentially generate conflicts in the design process.
<i>Situated Play Design (SPD)</i>	[19]	SPD is a further development of PD to better support people's social and emotional needs of contextual play to design for emergent and situated play engagement using play and playfulness as a design goal and design method. Within SPD, users are involved early in the design process (ideation) as creative partners.
<i>Scenario-based Design (SBD)</i>	[23]	Most iterative approaches are implemented for technical improvement and economical possibilities using exploratory prototyping and testing in collaboration with stakeholders breaking down barriers to collaboration in design and to future technology workshops with the aim of developing different scenarios of application.
<i>Iterative Development</i>	[18]	Integrating user feedback in the development process to <ul style="list-style-type: none"> • Understand the player and the application domain • Test with different high/low fidelity prototypes • Develop a risk analysis

Table 1. Cont.

Stakeholder Participation Method	Reference	Description
Interdisciplinary Teamwork	[32]	Developing serious games for CH requires an interdisciplinary team of game/immersive technology design experts (software engineers, visual artists, project managers, game designers), content matter experts, social scientists and even community members to identify the right game mechanics and application of the game/XR technology.
Co-creation	[30]	Value co-creation of tourist experiences in which tourists are prosumers, producers and consumers at the same time by involving them into the production or development process of the product or service.
Living Labs (LLs)	[20]	LLs are real-life test and experimentation environments, where users and producers co-create innovations, in a trusted, open ecosystem that enables business and societal innovation providing a collaborative involvement in interventions design that brings together researchers, stakeholder groups, and end-users. LLs enable the co-creation of user-driven and human-centric research, development and innovation of technologies, product and services focused on the wellbeing of people.

3.2. Discussion of Various Related Theories on Stakeholder Participation

The emergence of new technologies can create value not only for the CH sites, but for society at large, in terms of technological, economic, and political advancements [31]. Within the digital development process, user involvement is often limited to user testing to resolve usability issues or evaluate the user acceptance. Hence, user testing is restricted to later stages in the development process and thus rarely allows local communities to participate in the creative stages of conceiving or game development [33]. This approach, however, does not create ownership by or identity for the local community with the digital end product which might even be far from their own interpretation of heritage. Also, as technology is intensifying the cultural heritage experience, the development of third-party software that is owned by tourists but not directly managed by CH sites increases.

The stakeholder participation methods showed in Table 1 provide opportunities to validate users as creative partners and identify those who hold a stake in the development process of digital products which represent values and traits of their heritage. Moreover, this more *emic* perspective [26] recognises the power of communities to safeguard their own heritage, the relevance of their knowledge to understand it, and the centrality of their perspective to interpret it, and perceives their participation as an appropriate, valuable and relevant procedure which provides insight, content, and business opportunities for the local communities when they are included in this development.

4. Towards the Development of a Framework for Stakeholders' Involvement in CH Digital Productions

In the present section, we discuss a number of projects we were involved in which various forms of stakeholders' involvement as those described in Table 1 above were (partly or completely) applied. The insights gained in these projects form the basis of the holistic framework for stakeholders' involvement in CH digital productions that we will discuss in the following section (Section 5).

In order to get to a holistic understanding of this involvement, we identify the following roles stakeholders might take up depending on their relation to the heritage site:

1. Heritage site visitors or game users as the *consumers*.
2. Heritage site directors as the *service providers*.
3. Heritage experts and curators as the *institutional content providers*.
4. The local community around a heritage site as the *local content providers*.
5. Researchers facilitating the process as *process experts*.
6. The artists, designers and technical people that help give form to the site as the *producers*.

These stakeholders can be involved in many ways in the design process. We list below the main design activities we identify. They will later be merged into our own framework (see in Section 5). We consider *co-design* as the overarching process encompassing various activities in which the stakeholders mentioned above can collaboratively design. In line with Darzentas et al. [34], these activities can be:

1. *(Co)-ideation*: involving the end users (the *consumers* in our taxonomy above like the visitors of a heritage site) and the local community around it in ideating a concept intervention early in the design process [34].
2. *(Co)-collection*: the acquisition of content from non-institutional instances like the local community ([35], quoted in [34]).
3. *(Co)-creation*: it lies at the core of the co-design process and it refers to the ‘active participation, dialogue, and collaboration between participants, producers, and a variety of other stakeholders throughout the process of designing, participating in and reflecting on an experience’ ([36], p. 118). Co-creation occurs within this networked eco-system of informed and equal players which *create* value together [27]. This requires an open and continuous dialogue among the stakeholders, access to the same information for all those involved, and transparency with respect to such information, which results in a clear estimation of what the risks and benefits involved in this process are [27]. Recognising and accepting such risks is what makes them responsible for the end product.
4. *(Co)-interpretation*: the meaning making process of heritage understanding which depends on the frame of reference adopted by the viewer. This might result in a completely different and unexpected perspective the heritage site or artefacts are looked at (see again also in [34]).

4.1. Agency of Secrets

The Agency of Secrets game is one of the forty gamified experiences developed under the EU-funded MED GAIMS project (GAMification for Memorable tourist experiences ENI-CBC-MED A_A.1.3_0209, Medgames.com, accessed on 2 February 2022), which aims at creating gamified memorable experiences for tourists. The Agency of Secrets is both a game in itself and a gamified platform that allows to connect nine different experiences. They all take place in the city of Vilanova I la Geltrú, a city 40km South of Barcelona in the Eastern coast of Spain. The city lived its most important historical period during the last third of the XIXth century, when some important events took place there: the arrival of the train, the opening of the first museum, and the formation of a creative group of writers, artists, businessmen, explorers, and politicians to manage these infrastructures. This generated a pole of attraction of talented people lead by Victor Balaguer, a famous writer, journalist, politician, and mason, to move to the city.

It is around the historical figure of Victor Balaguer that the gamified experience whirls around, as he is the most important and visible character in the city history, with the Victor Balaguer Museum as the physical evidence of it (Figure 1).

The game requires its players to visit different places in the city (the nine experiences mentioned above) and solve the secrets related to them as agents of a secret agency. The progression from one solved case to another one to solve is gamified: the more cases are solved and secrets are discovered, the more rewards the player gets. Hidden secrets are the storytelling device that is used to entice players to progress in their quest.

The game was designed and developed involving three different and clearly defined groups of stakeholders, covering the full spectrum of stakeholders identified above:

- A game production team: this was the Neàpolis team, which is the development and innovation agency at Vilanova I la Geltrú. It consists of a game designer, a graphic designer, and a game developer.
- Cultural and tourism stakeholders in the region, like the heritage owners of the Victor Balaguer Museum and of other heritage sites in the city, and the local tourist office, due to the close link with tourism that the MED GAIMS project has.

- Visitors and tourists, game end users, and the local community: they were involved at different stages of game development (see Table 2 below).

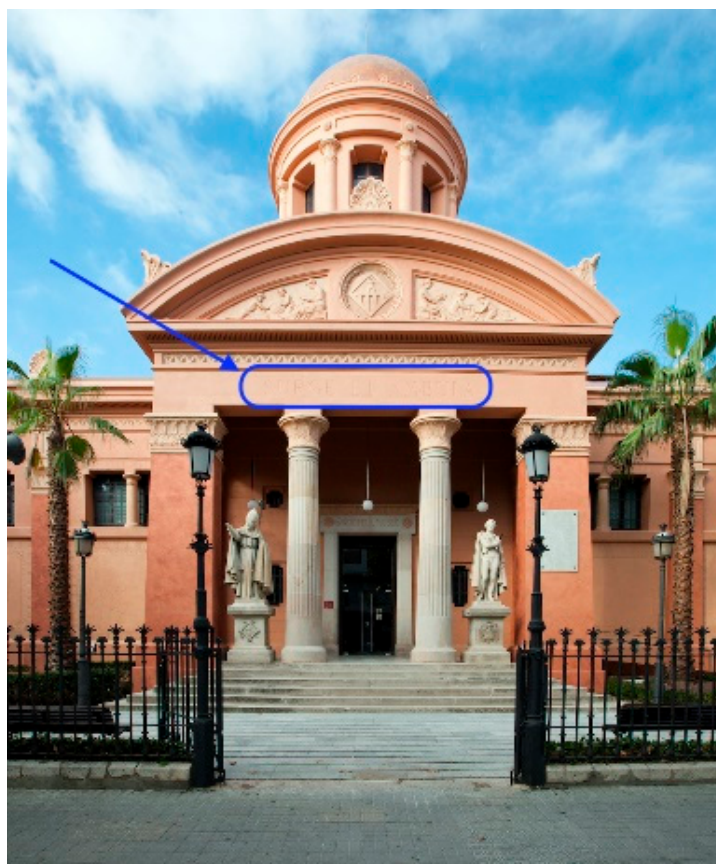


Figure 1. Victor Balaguer Museum with its motto ‘Surge et Ambula’ on the top of the main entrance, which is used as the logo of the game.

Table 2. Contributors to the development of Agency of Secrets.

Phase	Stakeholder	Role	Activity	What?
Phase 1	Designers	Producers	Co-interpretation	Context analysis: Research on the historical locations
	Researchers	Process experts		Meeting the local stakeholders to investigate possibilities
Phase 2	Designers	Producers	Co-ideation	Identify possible design solutions
	Local stakeholders	Local content providers		Iterate through conversion & diversion
				Refinement
Phase 3	Designers & artists	Producers	Co-ideation	Edit and deploy in iteration loops
	Visitors & users & citizens	Consumers		Test the game & give feedback
	Heritage and Tourism stakeholders	Institutional content providers		Alpha testing

In Table 2, the 3 phases of participative game development are described in detail. In Phase 1, the main stakeholder involved was the Neàpolis team. They conducted several activities to understand the historical importance of the location by means of historical research on the site itself and meetings with the local stakeholders. In details, the research consisted in:

- Historical research on the museum in the Víctor Balaguer Foundation Library.
- Interviews with various heritage stakeholders about the history of the building and of the historical period.
- Physical visits to the places that are part of the game.
- Interviews with local residents about their knowledge of and interests in the history of the city.
- Interviews with descendants of some of the city most prominent historical figures as they had expressed the wish that their ancestors' contribution to the city would be more visible and acknowledged.
- Collaborative work and meetings with the heritage owners and tourism local office to identify their needs, concerns, and interests.

In this first phase of game production, the design team also engaged in living labs activities with FIL, the Innovation Local Forum, a group of citizens interested in participating in creative processes. Some research sessions were held during which a first stage of motivation detection was run. This refers to the first stage of Situated Play Design (see in Table 1), the Chase the Play phase, which aims at detecting the most favourite interactions of the users with the system and their motivations for it. These key emotional triggers were important at the time of developing the game mechanics, so that, for example, if 'discovery' is a motivation given by the users, then the system should be designed in a way by which rewards provide some discoveries, or the game takes the user to a place not yet visited (so, a discovery).

During Phase 2, the Neàpolis team was still in charge of guiding the ideation process, but the other stakeholders mentioned above also actively participated in it. The activities that were conducted in this phase consisted of:

- An ideation process during which field activities like tour group observations at the locations and interviews with museum guides took place. An important part of the ideation process was also the in-lab design with card sorting exercises with selected users following the patterns of a user persona profile.
- A creative lab activity which was run with other experience designers to validate and polish the first game concepts.
- Milestone meetings with heritage owners and experts in the city history at certain development steps, during which the right content for the gamified experience was collected.

In Phase 3, visitors and users were added to the designers' team and to the local stakeholders to test first lo-fi prototypes and then confirm or decline the direction of the game experience in the early stages. The in-built alpha prototype was tested with a selected group of users in the first stage and later, during Open Days activities, all local residents were also welcomed to participate and give feedback. Heritage and tourism stakeholders were involved in the alpha testing once the second iteration of the game was developed.

In short, for the data collection, these are the activities that were performed:

- Card sorting in living labs with FIL
- Co-design lab with designers
- Surveys and interviews with residents during Open Days when the alpha versions of the games were tested
- Surveys and interviews with citizens during Test Days and Technical Days during which the beta versions of the games were tested.

Data analysis was performed through the interpretation of the quantitative and qualitative information gathered in the several activities. This allowed to detect the strengths and weaknesses of the design and the user's pain points.

The most important lesson we learnt from the process of developing the Agents of Secrets game is that the participation of the final users in the early phases of development is key because it determines the form the ultimate product will take. But also the heritage experts (directors, curators, researchers) are important to determine this, because they provide the necessary cultural background and context for the game itself. Another insight is that it is also important to know early enough who will be responsible for managing the experience once launched: will the museum have enough staff for this? Will they be skilled enough to do so, that is to update the content and maintain the systems? All these considerations may still have an impact on the design itself.

4.2. The Mill

The Mill game was also one of the 40 gamified experiences developed within the MED GAIMS project. The Mill is a serious game that aims at educating tourists on the correct functioning of a historic water mill located in the Mseilha Region of North Lebanon (Figure 2). This know-how is considered today almost extinct as there are only a handful of people in Lebanon who can properly operate it.



Figure 2. Mseilha Fort showing the mill to the right of the castle in red.

The Mseilha Fort (Figure 2) was one of the strongholds edified along the road between the cities of Batroun and Tripoli to preserve security and to ensure communication and traffic control; it had a great strategic and military importance. The Mseilha Fort is built on a long, narrow limestone rock near the Nahr el-Jawz river. Its walls are constructed with small sandstone blocks quarried from the nearby coast and built on top of the rocky limestone outcrop.

The production team of The Mill game included faculty members and developers from the American University of Beirut (AUB) on the one hand, and historians and archaeologists from the Directorate General of Antiquities (DGA) on the other hand. The AUB team was mostly concerned with the technical details of the game, while the DGA team provided the required know-how in terms of historical mechanical components and correct operational sequence of the mill.

The mill was developed in three main phases: (1) problem understanding, (2) ideation and conceptualisation, and (3) development. Table 3 below gives an account of the various contributors in the different phases.

During Phase 1 of game production, the production team (i.e., AUB & DGA) conducted an exploratory visit to the Mseilha site to better understand its historical value and to be able to better ideate a theme for the desired gamification experience, accordingly. Given the war-like historic nature of the site, the most intuitive theme for the site was that of a

game in which users engage in a battle. However, in one of our visits to the site, we met with local inhabitants and shop owners near the castle and were told stories about how their ancestors not so long ago used the water mill (shown in a red square in Figure 2) to produce flour, groat, and olive oil. They also voiced their appreciation of any tool that could help promote their local businesses of organic products. As a result of this exercise, the idea of creating a gamification experience around the water mill came to life.

Table 3. Contributors to the development of The Mill.

Project Phase	Stakeholder	Role	Activity	What?
Phase 1	Site Directors	Service providers	Co-ideation	Provide constraints in the form of a site official opinion on the game
	Designers	Producers		Frame possibilities to unveil game potential
	Local community	Local content providers		Put forward the interests of the locals
Phase 2	Designer	Producer	Co-development	Develop the game providing technical know-how
	Heritage expert	Institutional content provider		or content know-how
Phase 3	Designers, artists	Producers	Co-ideation	Edit and deploy through iteration loops
	Visitors & Users	Consumers		Test the game and give feedback

During Phase 2 of game production, the production team developed The Mill game concept. To do so, the team had to rely on the expertise of a historian on the production and operation of water mills. Together, the team co-created a (physical and digital) game in which the visitor plays on a handheld device the construction of a water mill. Each time the game is complete, the actual physical mill is turned on for a minute by channelling water to it.

During Phase 3 of game production, the alpha prototype game was deployed and a selected group of game testers ($n = 52$) with different educational backgrounds, gender (with a slight majority of male testers), and age (32 of whom in the age range 17–27 years) were invited to test the game during an open-day event. They expressed an interest in gamified tourist experiences and indicated to consider games as a useful tool to get a richer knowledge about tourist destinations, one that can also easily attract more tourists to such destinations. Incredibly enough, this game was for most of them their first encounter with a gamified tourist destination.

Their feedback was used to iterate the game and produce a final gamified experience.

The insight that we gained from this experience is the value of involving local inhabitants throughout the entire game development process, from the ideation of the game itself, to the development of a prototype, to the final game design through iterative loops. Without the involvement of this important group of stakeholders, we would have missed the opportunity to produce more than ‘just a game’, that is a game that visitors might very well enjoy but that offers no benefits to the local community. Instead, by including the locals, the game can tangentially contribute to the growth of local economies (in this case sellers of organic products) and ensure the sustainability of the game thanks to the added sense of ownership the locals could feel towards it.

4.3. Brabant Remembers

Brabant Remembers is a project about WWII heritage in Brabant, a province in the South of the Netherlands (more on this can be found in [37]). It deals with intangible WWII

heritage in the form of personal life-changing stories of those who survived the war. These stories are related to sites in Brabant where WWII events of various kinds (from occupation to resistance, from persecution to liberation) took place, in its first phase involving three museums and a commemoration centre.

These four heritage sites are only linked to one another by their relation to the war, what they however handle in very different ways: one is a big museum situated at the location where an important battle to liberate the country was fought and celebrates this by means of showcasing heavy artillery (like tanks and airplanes); one is a small and private airplane museum; another one is a museum commemorating the Polish troops which liberated the city of Breda and is dedicated to the memory of the General who led the liberating army; and finally, the last one used to be a detention camp from which mainly children were transported to an extermination camp in Germany and was later used as a concentration centre for conspirators during the Moluccan war.

In the early stage of the project, only the directors of these heritage sites were involved. The first phase of the project consisted in developing an overarching narrative concept that could connect these four sites narratively. The directors were interviewed and were involved in co-creating sessions in which they were asked to share what according to them is the most representative story related to their site that could be used to showcase it, so that visitors could more easily identify the site by associating this story to it. These stories were used as a tool to fine tune the narrative concept, that became *Crossroads*: crossroads are the life changing moments or dilemmas certain people had to endure during the war. For Kamp Vught, this story is the story of George and Ursula Levy (Figure 3).

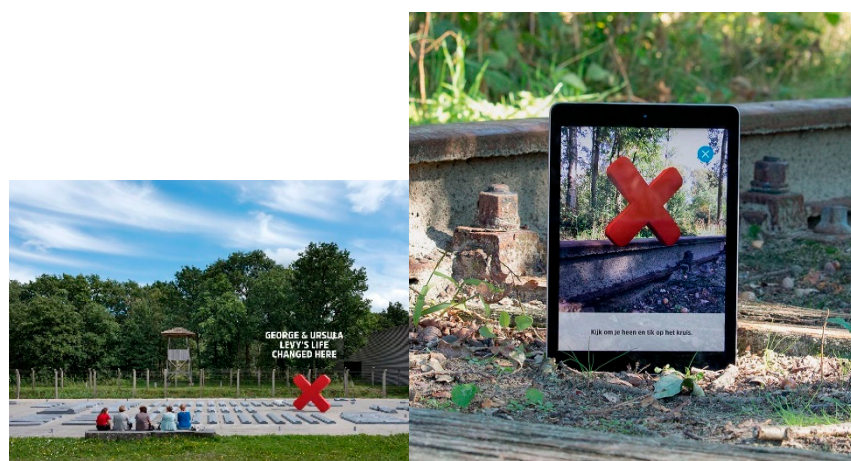


Figure 3. Kamp Vught, where the story of George and Ursula took place (*left*) and the AR video starting screen (*right*). (Reprinted with permission from ©BrabantRemembers).

In the second phase of the project, a call for stories was launched by Brabant Heritage to all municipalities in Brabant with the goal to collect as many of these Crossroads stories as possible. To achieve this, 15 events were organised across the province in 2017 and 2018, in which the local community was invited to share such stories [37]. During these events, workshops were also given in which the Crossroads story model was introduced, namely what characteristics a story would need to have to be considered a Crossroads story: these are the turning points in it and the dilemma that the protagonist had to face and that has changed the course of their life. About 1000 such stories were collected. A special committee was then set up, the so-called Content Council Crossroads, comprising experts in history and in narratology, with the task of selecting 75 out of those almost thousand stories that were sent in, one for each year from liberation. They rewrote them in Crossroads format [38] for publication (Phase 3 in table below).

In the last and current phase of the project, several interventions have emerged autonomously. Among them, 75 short mini-documentaries broadcasted by the regional

television, 75 so-called Still Lives, i.e., 60 × 60 cm models made by a local artist, a maze, and, more importantly in the context of this discussion, 11 location-based AR-videos and 5 full 3D stories that can be re-lived by entering a virtual gate and bringing the viewer back in time. For all of them, designers, artists, and technicians have been involved: they have used the above mentioned 75 stories as raw material, have somehow re-interpreted them and given them a different form.

Table 4 below summarises the four phases that can be recognised in this project, indicating the main stakeholders involved in each phase and the role they played in the design process, together with the design activity that is most evident in that specific phase.

Table 4. Contributors to the development of Brabant Remembers.

Project Phase	Stakeholder	Role	Activity	What?
Phase 1	Directors	Service providers	Interpretation	Museum official view on the topic
Phase 2	Community	Local content providers	Co-collection	Personal life-changing stories
Phase 3	Heritage Experts	Institutional content providers	Co-interpretation	Selection of 75 Crossroads stories
	Researcher	Process expert		
Phase 4	Designers Artists Technicians	Producers	Co-interpretation	New insights across the domain in the form of various interventions/artifacts

The insight we have gained from this case, is that local content providers like the local community are eager to be engaged in the design process if they can identify themselves with it, with the values it represents. This explains why we were able to collect so many stories during Phase 2 of the project. However, in the absence of a clear mandate, or of clear agreements among the stakeholders, this engagement tends to fade away after some time.

4.4. SmartCulTour

In contrast to the previously introduced projects, SmartCulTour is a role-playing game for policy interventions in the sustainable cultural tourism context. The SmartCulTour game (Figure 4) has been developed within the framework of the SmartCulTour project, funded under the Horizon2020 research and innovation programme (Grant agreement No. 870808). The serious game is an integral part of a self-help intervention toolkit and roadmap applied within the six SmartCulTour Living Labs (smartcultour.eu/living-labs, accessed on 2 February 2022). The objectives of the labs are to set up a community of practice and create a bi-directional flow of information between multi-actor communities, to develop capacities, identify successful practices, and provide input and feedback, as well as testing and trialling the SCT (Sustainable Cultural Tourism) framework (smartcultour.eu). Within the Living Labs, different stakeholders (i.e., resident groups, cultural and creative industries, local policy makers, tourism industries) are invited to learn about possible cultural tourism interventions and their effects on a chosen cultural heritage site.

In the first phase, more than 100 best practices were collected from the cultural and tourism sector to identify state-of-the-art policy interventions in regard to economic, social, cultural, and environmental impact provided by policy, heritage, and tourism experts (a summary of all insights can be found on smartcultour.eu/deliverables—Deliverable 3.1). Besides the team of researchers, who collected the interventions, local communities, heritage managers and policy makers contributed with best practices and their impacts to the content of the game.

Phase 2 was concerned with the game development between process experts and the game developers and designers. This phase included a paper prototype with a set of heritage interventions, player roles, and game mechanics, which have been tested to balance the game for a good game experience. Iterative testing was followed by sprints to improve the game based on collected feedback.

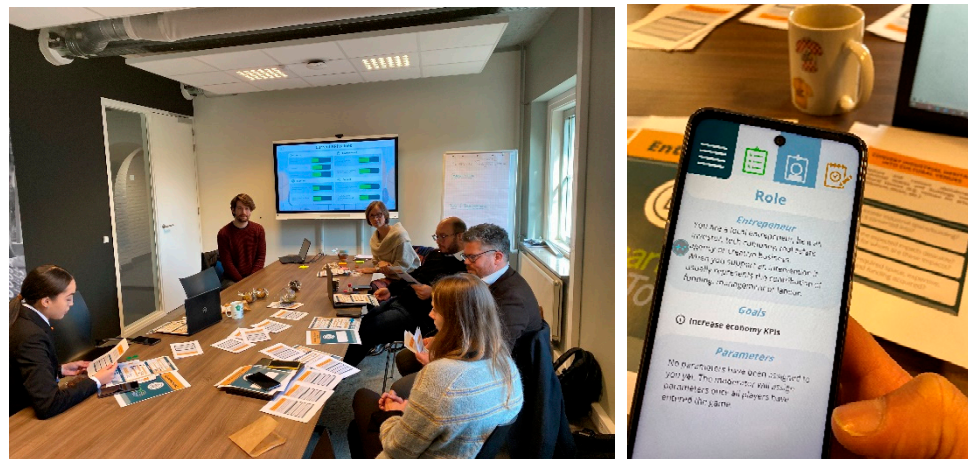


Figure 4. The SmartCulTour game (*right*) during a Living Lab session with stakeholders (*left*).

In Phase 3, we played the game together with the living lab communities participating in the project. Participants ranged from (art) community leaders, municipality workers, researchers to policy makers and tourism professionals. The game sparked discussions between the players around sustainable cultural tourism interventions and their effectiveness and efficiency within the living lab area.

At the time of writing this article, game evaluations are still ongoing, hence some changes may apply to Table 5 below. However, some first insights can already be shared from two game sessions of the Rotterdam (NL) and Huesca (S) Living Lab. Playing the SmartCulTour game with its policy cards and dashboard provides a valuable method for engaging in a co-created community intervention with local and regional stakeholders, including community leaders and residents. Participants reported that the applied game is designed with the reality of organisational processes, roles, and resources in mind, which very much draws on the first phase of the game development process. Besides, it was also experienced as a disruptive method as it triggered players to unlearn and think outside given structures and to be successful in realising cultural tourism interventions in their region.

Table 5. Contributors to the development of SmartCulTour.

Project Phase	Stakeholder	Role	Activity	What?
Phase 1	Policy makers Heritage managers Community	Institutional and local content providers for the interventions	Co-collection	Best practice interventions Impacts and resources
	Researcher	Process expert		Identifying, gathering and selecting interventions
Phase 2	Game designer	Producer	Co-design	Contextualising and conceptualising the collected data, gamifying interventions and measurable KPIs, prototype testing
	Researcher	Process expert		
Phase 3	Living Lab community (as defined above)	With various roles as part of the ecosystem	Co-testing	Gaining new insights and creating discussions across the domains of culture and tourism
	Researcher	Process expert facilitating and evaluating the game		

5. A Framework for Stakeholders’ Involvement in CH Digital Productions

Based on the experience gained in the projects discussed in previous sections, we built a framework for the development of digital cultural heritage tools in a participative manner.

This framework is shown in Figure 5 below. From the above-mentioned projects, we have identified the main roles of the stakeholders involved in the development process, as either service providers (the site directors), producers (the designers and artists), institutional content providers (the domain experts in cultural heritage), consumers (the visitors and users of the site), local content providers (the local communities), and process experts (the researchers). The 4 co-design activities (i.e., co-ideation, co-collection, co-creation, and co-interpretation) that we have discussed for each project in Section 4 merge now into three subsequent phases of developing digital cultural heritage experiences; *understand*, *explore*, and *materialise*.

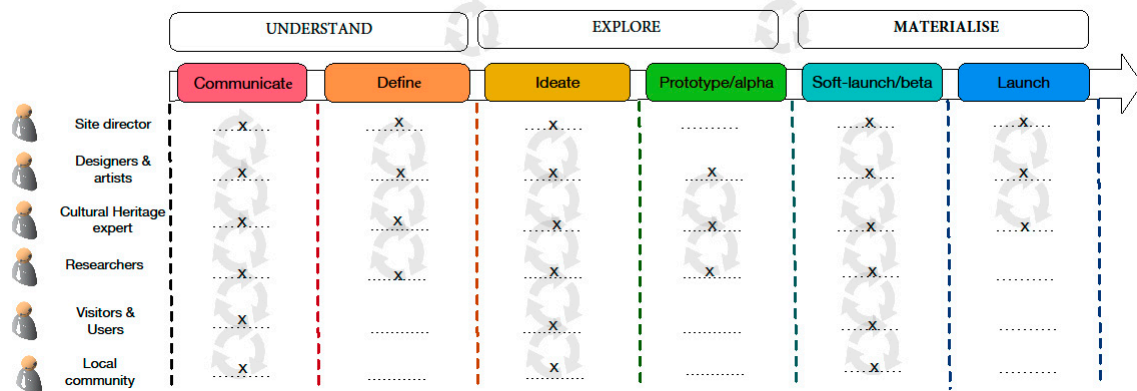


Figure 5. Framework for participative development of digital cultural heritage. Grey arrows signify collaboration and feedback between stages. Understanding the problem first involves communication among all the stakeholders with the objective of defining the design challenge from various perspectives. Using this definition, all stakeholders meet again to ideate a concept intervention, which is prototyped by the designers, CH experts, and researchers. The product is iterated with feedback from all stakeholders before it is finally launched.

This formulation better captures their intertwining in different moments during the co-design process: *Understanding* the design challenge (through co-interpretation and co-collection), *Exploring* relevant conceptual opportunities (through co-ideation and co-creation), and *Materialising* a solution to it (through co-creation and co-interpretation). Each phase is further divided into two stages: a first one, in which all stakeholders are involved to either define, ideate or soft launch the digital intervention co-creatively, and a second one where, as in traditional practice, only experts or designers are active to identify the higher standards necessary to safeguard the successful completion of the digital product. This is the stage where sector specific knowledge, competencies and skills are required.

If we take a closer look at each phase, for the *Understand* phase, it is recommended that all stakeholders collaborate to both formulate the design problem and spell out the needs of all those involved (i.e., Communicate). While the standard practice has been to only include site directors and domain experts at this stage, the addition of local communities, designers, and visitors will allow a better understanding of what is important to the people in that area, as stated in Section 2. In the second stage of *Understand*, i.e., Define, the design team translates this information into specific requirements that the digital intervention will have to comply with.

In the *Explore* phase, again all stakeholders work together to brainstorm ideas and propose solutions (Ideate stage) to the problems and challenges identified in the *Understand* phase. Once done, in the Prototype stage, the designers and experts develop an alpha version of the product.

Finally, in the *Materialise* phase, the digital intervention is soft launched by means of an activity where all stakeholders play a role (like a pop-up event or a public lecture), but then again it is only for the site managers in consultation with the designers for the

practical side of it to determine how the final and official launch of the digital product will look like (during the second stage of Launch).

Note that throughout the entire co-design process, the product design and development circulate back and forth across the phases of *Understand*, *Explore*, and *Materialise*, after tests and assessment are performed at each stage.

6. Discussion

The cases discussed in Section 4 demonstrate that there are multiple ways in which non-institutional stakeholders can be engaged in heritage safeguarding. All of them apply some form of participatory design (as seen in Table 1) for the development of digital cultural heritage experiences. But each of them translates it differently depending on the content of such experiences, their context and the form that these are given. So, for example, the two serious games more specifically implement P-III process (The Mill) and SPD (Agency of Secrets), whereas the SmartCulTour game heavily relies on the LL approach to co-creation. Interdisciplinary teamwork is a common denominator across these cases, even if this was implemented in different ways depending on their own setting. Brabant Remembers is the case where participatory design is applied by the book also with respect to the role played by both the heritage community and the community of practice as defined in Section 2.3.

Regardless of what form of participation (as discussed in Section 2.3) is chosen, reaching out to the local stakeholders, be them the local community, the local businesses or policymakers, and engaging them in the design process from the start is the only guarantee to a lastingly meaningful experience of their local heritage, both for them, who can in this way clearly express the value they ascribe to it, and for external parties like tourists or end users, who are thus exposed to a more authentic encounter with such heritage.

Our framework captures this insight by foreseeing for each phase two separate and subsequent moments in which the various stakeholders play a role: in the first moment of each phase, all stakeholders participate in the co-creative dialogue to identify the common values that the final product is deemed to express. This is the only way for them to be able to claim ownership on it and feel responsible for its success once deployed. Only when more content-specific knowledge, like technological knowledge that only a sub-set of the involved stakeholders possess, is required, the active participation of *all* stakeholders is not necessary nor required.

However, this does not undermine the central claim for a multi-stakeholder approach to designing digital cultural heritage experiences that is advocated in this article. On the contrary, the framework highlights a number of benefits and advantages that emerge when involving a broad range of stakeholders in the development of technological productions for cultural heritage and that we could directly experience in the cases reported in Section 4. The most important one is certainly an increased sense of awareness and ownership from the community with respect to their heritage. This is further reflected in an increased sense of place and of community identity, and in a better understanding and knowledge of the heritage that is present locally and of the possibilities to promote it to external visitors. In Brabant Remembers, for example, collecting and sharing stories from our common history has spilled out into myriads of further activities like the location-based AR-videos and the virtual stories that were not planned in the original set up of the project. Community cohesion is what we have also experienced in the SmartCulTour game. The game as part of an elaborate toolkit of cultural tourism interventions engaged stakeholders meaningfully in discussions around sustainability, identity, values, and community involvement within heritage sites. Finally, The Mill shows how a game can be more than 'just a game' and help promote local businesses and economies, which are yet another type of heritage as the one the game is centred around.

Involving the local stakeholders in the earlier stages of development, especially in the Ideate stage, is something that is not yet common practice in CH digital productions, as we can see from Table 1 above. However, this approach presents many positive benefits for both the community and the final product: it lowers the barriers to technology, allows for the

acquisition of new skills, not just the digital ones but also those related to communication, critical and creative thinking, problem solving, and can further strengthen the sense of community and of belonging. What becomes the object of the digital production is not just some heritage, but it is the heritage as it is perceived, experienced, and felt by those who own it. This offers visitors a lens through which they can themselves access and experience it differently, identifying maybe with the locals, discovering those hidden gems that traditional tourism tours and productions may not provide or understand. It is for the tourists themselves as being immersed in a life and setting that is not really theirs, getting back in time (as in the Agency of Secrets), feeling like the real protagonists of those stories (as in Brabant Remembers), letting the players experience the values and authenticity of the community based on digital storytelling (as in The Mill), while partaking and engaging into decision-making processes, which allows them to take responsibility and ownership of their cultural heritage legacy (as in the SmartCulTour game). Communities may have a mandate for ownership by which they can really drive the development of the CH sites with the use of technology as complementary to a top-down approach.

This bottom-up and community-centred view on digital production engages them also in transparent and accessible governance activities (like in the SmartCulTour game, again), fosters grassroots and people-led innovation and effectively also improves the wellbeing and connectedness of the community. Because of this empowered role as co-creators, community inclusivity is nurtured.

7. Conclusions

This article aims at sparking a discussion among the design research community about the importance of involving the local community and the end users (like the tourists) within the design process of digital and gamified experiences around cultural heritage. The four cases presented show how digital tools may support the interpretation of intangible and tangible heritage and the importance of connecting these interpretations to the local community in a bottom-up approach to create ownership and identity for them.

As (design) researchers and developers, we often work with content-matter experts (historians, cultural heritage professionals), who bring their exclusive perspective on heritage interpretation, which is often not accessible to or recognised by the local community, but we miss and value the broader spectrum of competences, knowledge of the hidden gems and expertise that the community around a heritage can share. Reaching out to them and involving them in safeguarding their own heritage seems to us the only way forward for a sustainable policy making in cultural heritage, as it is being advocated by many other scholars (like [26,27], among others), or instances like the Faro Convention [26]. As, in this article, we are discussing the production of digital, often gamified interventions where a process expert (see in Section 4) is always involved, it will be their responsibility to define together with the service providers, how the local content providers and the consumers can be involved in the design process. The cases discussed in Section 4 show possible approaches to it: in one case, local content providers and consumers were invited for consultation to play a policy game (the SmartCulTour game); in another case, consumers were invited to share their stories through a call for content (as in Brabant Remembers). In one other case (the Lier experience discussed in Section 2.2), a call for volunteers to act as ambassadors to the local community was launched to select a small number of local highly engaged representatives who would serve as interconnecting pin between the service providers and the local content providers in the large. In one case (the Agency of Secrets game), residents are involved in a playful session of Chase the Play to identify emotional triggers of engagement. And finally, in yet another case (The Mill game), the involvement of the residents happened almost serendipitously but the success of the game is again a clear demonstration of the added value of such an inclusion.

The framework we have proposed in this article is one way of achieving this. Many more approaches exist, as those briefly sketched in Table 1. Our framework was built by reflecting on our own experience as from the four cases we have discussed in Section 4,

which cover a wide range of approaches to stakeholders' involvement in the design process. We recognise the necessity to develop further *ad hoc* interventions where this framework can be properly applied, with the aim of validating and fine tuning it. For this reason, we are not yet able to draw definitive conclusions on its validity and generalisability, but the cases we presented already demonstrate its viability and applicability to a broad spectrum of scenarios.

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