Gamification of heritage for community involvement in low-density territories

The Heritage Game project

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FOREWORD

As the title suggests, this publication delves into three key notions: Gamification, Heritage, and Community Involvement, particularly in the context of Low-Density Territories.

Heritage is a palimpsest of tangible and intangible cultural expressions, an intricate web of memory and meaning through which a community negotiates its identity and historical continuity. It manifests in monuments, rituals, oral traditions, landscapes, and craftsmanship, each a vessel of accumulated knowledge inscribed with the sediment of time. Nevertheless, preservation is no mere act of conservation; it is an interpretative process, a hermeneutic exercise that demands both fidelity and reinvention. To endure, heritage must not fossilise but resonate, inviting reinterpretation so that cultural narratives remain legible, vital, and compelling for future generations.

Much like interpreting heritage itself, gamification is an alchemy of engagement - a method by which the static is rendered dynamic, the distant made immediate. By weaving game mechanics into the experience of cultural and natural heritage, it invites the spectator to become a participant and the observer to step into the narrative. Through challenges, rewards, and interactive storytelling, gamification does not merely entertain; it compels discovery, fostering a more profound, personal connection with the past. In this way, it reconfigures heritage as a lived experience, an unfolding dialogue between history and those who seek to inhabit it rather than merely contemplate it.

Community involvement is the sine qua non of sustainable heritage conservation, for a legacy untethered from its people risks becoming an artefact devoid of resonance. When residents, stakeholders, and visitors are not merely spectators but custodians, heritage ceases to be a relic and becomes a shared endeavour, a collective narrative in perpetual construction. In this context, gamification serves as both a catalyst and conduit, transforming passive appreciation into active stewardship. Through digital storytelling, collaborative restoration, and immersive educational initiatives, it fosters a sense of belonging, ensuring

that heritage is not merely safeguarded by specialists but continuously reanimated by those who inherit its spaces and stories.

Low-density territories, often overlooked in the broader discourse of heritage conservation, present a paradox: they may be meaningful in historical, folkloric, and natural treasures yet constrained by economic limitations, sparse infrastructure, and a dearth of investment. In these areas, heritage risks fading into obscurity unless approached with ingenuity. Gamification offers a remedy, providing a cost-effective, scalable means to breathe life into these distant landscapes. Harnessing digital tools, fostering community-driven initiatives, and encouraging experiential learning bridges the divide between scarcity and significance, reigniting a sense of connection and pride in local heritage and ensuring that these forgotten corners are preserved and reimagined for the future.

This publication, Gamification of Heritage for Community Involvement in Low-Density Territories, emerges as a culmination of the Erasmus+ project "A Gamification Model for Community-Based Heritage Work" (No. 2023-1-PT01-KA220-HED-000154261) and stands as a testament to the symbiotic relationship between innovation and preservation. It delves into the complex interplay of these interrelated concepts, illustrating how gamification can act as a transformative force within heritage management.

The extensive authorship of this volume reflects the inherently interdisciplinary nature of gamification in heritage conservation. The diverse professional backgrounds - including IT experts, historians, archaeologists, economists, educators, designers, technologists, and cultural heritage specialists -provide rich insights and experiences. This multidisciplinary collaboration has allowed the project to approach heritage conservation comprehensively, ensuring that the strategies presented are robust, culturally sensitive, and effective across diverse contexts and communities. Through a blend of theoretical perspectives, practical methodologies, and real-world case studies, the publication offers a comprehensive roadmap for educators, game designers, policymakers, and heritage professionals eager to harness the potential of gamification in revitalising and preserving community heritage.

As readers immerse themselves in this volume, they will discover its profound potential to reshape how we engage with cultural legacies. The discussions move beyond theoretical musings, delving into real-world applications emphasising authenticity, cultural sensitivity, and inclusive design, ensuring that gamified heritage initiatives remain adaptable and practical across diverse social landscapes. The methodologies presented offer a means to assess the long-term impact of gamification, extending from immediate engagement to broader socio-economic transformations.

Essentially, this work strives to empower the public and the communities with the tools to harness gamification in ways that resonate deeply and responsibly. Whether by resurrecting forgotten crafts through digital simulations, enriching educational experiences with interactive challenges, or reimagining lost histories through the lens of technology, gamification offers a boundless canvas for reinterpreting heritage as a living, evolving narrative. In the end, heritage is a story that each generation must tell anew, and its echoes stretch across time. In this act of reimagining, this delicate dance between the past and the present, the true magic of gamification lies – transforming heritage from a static monument into a living, breathing dialogue between those who once lived it and those who will come to inherit it.

Silviu Miloiu & Célio Gonçalo Marques

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1. Introduction

Vojtěch Blažek, Petra Karvánková, Jiří Rypl

"Games have begun to influence our daily lives. They affect everything from how we relax to how we train for a marathon, to how we learn a new language, to how we manage our finances. What we used to call "games" has very quickly transformed into the way we communicate. Games are the future of work; fun is part of responsibility. And all of this is included in the gamification journey."

Zichermann & Cunningham (2011, p. 15)

Cultural heritage is more than a static collection of artefacts and traditions; it is a dynamic force that shapes our identity and guides our future. As UNESCO points out, heritage is not just a legacy of the past but a living compass for progress. However, preserving this heritage requires creativity and innovation, particularly in sparsely populated areas with significant historical, folkloric, and natural value, but often face economic disadvantages and reduced investment compared to urban centres. This is the moment where gamification becomes a powerful tool. Integrating game design with heritage conservation can create immersive experiences that educate, inspire and foster meaningful connections between people and their cultural roots.

In addition, gamification can support the protection of cultural and natural heritage by encouraging sustainable practices and raising awareness. Gamification applications can motivate residents to engage in conservation activities such as participating in clean-up events, documenting local landmarks, and adopting eco-friendly practices. By providing rewards and enjoyment through these activities, gamification can foster a sense of ownership and responsibility for heritage conservation et Gamification can be important in education and in promoting cultural and natural heritage. Educational games and platforms can provide accessible and engaging learning experiences, even in remote areas. By incorporating game elements such as points, badges and leaderboards, gamified educational tools can

motivate learners, track progress and provide immediate feedback, leading to improved learning outcomes (Deterding et al., 2011). For example, gamified heritage trails and virtual tours can enhance understanding and appreciation of local cultural and natural heritage, making learning more interactive and enjoyable.

This scholarly publication is intended for educators, game designers, community organisers, and heritage professionals who wish to explore and apply gamification strategies in the context of cultural heritage. It provides a structured and comprehensive approach, guiding readers through theoretical insights, practical methodologies, and adaptable tools to develop games that enrich cultural engagement. The central chapters examine core principles of heritage management, challenges specific to low-density areas, and the unique capabilities offered by gamification techniques. Unlike traditional educational methods, gamification effectively engages audiences, rewards curiosity, and fosters exploration. A well-designed game might challenge players to unravel historical mysteries, collaborate on virtual artefact restorations, or actively participate in real-world conservation efforts.

Key considerations within this publication include adaptability and accessibility, ensuring gamified experiences appeal broadly across diverse demographic groups. Discussions include multilingual interfaces, offline usability for remote areas, and inclusive designs for players with disabilities. Furthermore, methods for evaluating the impact of gamification—ranging from immediate engagement metrics to long-term socio-economic outcomes—are also explored. Additionally, this publication addresses crucial ethical dimensions, emphasising the need for authenticity, cultural sensitivity, and community-driven approaches. It advocates for participatory co-creation processes, ensuring equitable sharing of educational, social, and economic benefits with local communities.

This volume was developed within the Erasmus+ project "A Gamification Model for Community-Based Heritage Work" (No. 2023-1-PT01-KA220-HED-000154261), implemented from 2023 to 2026, involving collaborative efforts from the Polytechnic Institute of Tomar (Portugal), D. A. Tsenov Academy of Economics (Bulgaria), Valahia University of Târgoviște (Romania), University of South Bohemia in České Budějovice (Czechia), University of Trnava

(Slovakia), University of Camerino (Italy), and Adana Science and Technology University (Türkiye).

By the end of this journey, readers will possess a robust framework to design and implement gamified experiences that serve more than entertainment purposes. These innovative games can become transformative tools for heritage conservation, educational advancement, and strengthening community bonds. Whether reviving forgotten crafts through interactive simulations or utilising augmented reality to bring ancestral narratives vividly into contemporary landscapes, your initiatives have the potential to reshape cultural heritage into a dynamic, participatory, and meaningful experience. Let's get started.

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2. Heritage

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Heritage today is no longer defined by monuments or museums alone. Once closely tied to the symbolic authority of the past, the concept has now evolved into a dynamic, plural, and contested field. It now encompasses tangible and intangible forms, spans cultural and natural domains, and intersects with legal, political, social, and ecological concerns. In this chapter, heritage is treated as an umbrella term encompassing the tangible and intangible, the cultural and natural—unless more specific distinctions are required. The chapter explores this expanded understanding, focusing on how heritage is continuously shaped by human and non-human activity, community engagement, and global challenges. Rather than a static legacy preserved by experts, heritage is now seen as a social process—constructed, negotiated, and reinterpreted through diverse communities' everyday practices, memories, and values. This reflects a shift from preservation to participation, material emphasis to relational meaning-making, and anthropocentric control to ecological interdependence.

Furthermore, the chapter examines how heritage serves as a site of identity and memory and as a space of controversy, exclusion, and value negotiation. It considers the roles of international bodies, such as UNESCO and the Council of Europe, alongside grassroots movements that challenge authorised heritage discourses. Attention is given to how emerging digital technologies, environmental awareness, and critical heritage studies contribute to reshaping heritage practices and expanding the boundaries of what is considered worth preserving. Ultimately, the chapter calls for a more inclusive, reflexive, and future-oriented approach that treats heritage not as a finished object but as a shared and evolving process for understanding who we are, where we come from, and how we might live together in a changing world.

2.1. Heritage: Perspectives and Frameworks

Heritage (*patrimoine culturel*) encompasses tangible artefacts, as well as intangible traditions and features passed down through generations, shaping collective memory and identity. Traditionally, heritage was viewed primarily through the lens of monumental and material preservation, focusing on static objects deemed worthy of conservation. However, contemporary perspectives have expanded this definition in three key ways. First, heritage has undergone a typological and thematic extension, incorporating elements that historically fell outside conventional chronological and geographical boundaries. Second, the perception of monuments has shifted from isolated objects to integral components of their broader cultural and historical context, encouraging a more holistic approach to heritage conservation. This evolution reflects a dynamic understanding of cultural heritage that recognises its fluidity, interconnectedness, and the need for adaptive preservation strategies (Vecco, 2010). Intangible heritage, intrinsically embedded within material culture, functions as a cognitive and symbolic framework that shapes and redefines tangible expressions of the past. This integration facilitates the transmission of traditions, practices, and collective memory, ensuring cultural continuity through processes of adaptation and reinterpretation (Ayoub, 2011; Rochaix, 2020). The contemporary paradigm of heritage studies also acknowledges the reciprocal influence of culture, nature, and society in attributing dynamic meanings to cultural heritage, which has shifted its significance over time. Additionally, integrating digital heritage tools enhances conservation methodologies and accessibility, transforming heritage from a static repository into an interactive and evolving domain of knowledge production and cultural engagement (Brandano et al., 2025).

Before the mid-20th century's formal classification of tangible heritage, societies understood and valued physical cultural assets through a lens of historical narratives, religious significance, and later national identity. Drawing on *homeostasis* - the process by which living systems maintain balance – theorists such as William Morris envisioned preservation in the last quarter of the 19th century as a continuous, adaptive practice. In his view, monuments are not static relics but living entities that require constant, gentle interventions to sustain their inherent vitality. Just as homeostasis ensures an organism

remains stable and resilient despite constant cellular turnover, routine maintenance also preserves our built heritage's cultural and structural integrity. This approach emphasised that the actual value of a monument lies in its capacity to adapt and thrive through consistent care, mirroring the dynamic equilibrium fundamental to all living systems (Toleva-Nowak & Nowak, 2018).

Since its establishment in 1945, UNESCO has implemented practical and legislative measures to protect heritage, focusing initially on education, science, and culture policies and responding to emergencies from war and conflict. The post-war era highlighted the need for international collaboration to preserve common values and protect world heritage. This led to the adoption "The Hague Convention" in 1954, addressing the protection of cultural property during armed conflict. The Convention broadly defined "cultural property" as monuments, archaeological sites, works of art, and museums.

In 1972, the Convention Concerning the Protection of the World Cultural and Natural Heritage was signed, marking a significant achievement in global heritage protection. Ratified by 196 countries, it established a comprehensive framework for defining and conserving World Heritage, integrating cultural and natural dimensions, and creating the World Heritage List. In 2005, the criteria for identifying heritage were unified to promote holistic conservation, emphasising international cooperation and recognising heritage as a shared legacy of humanity.

The World Heritage List currently includes 952 cultural, 231 natural, and 40 mixed properties across 168 States Parties, showcasing a global commitment to preserving diverse legacies. UNESCO's 1972 Convention established an international network, defined stakeholder responsibilities, and created the World Heritage Fund to support conservation efforts.

A fundamental aspect of the Convention is its legal definition of heritage, which establishes a framework for identifying, protecting, and preserving monuments, groups of buildings, and sites. This classification serves as a juridical basis for state obligations, international cooperation, and the enforcement of protective measures. As the Convention defines, monuments include architectural works, monumental sculptures, paintings,

archaeological structures, inscriptions, and cave dwellings. All these are recognised as tangible expressions of artistic and scientific achievements and are granted legal protection due to their universal cultural value. Their status imposes specific obligations on state parties, including documentation, conservation, and, where necessary, implementation of legal instruments to prevent degradation or destruction (Labadi, 2013). Similarly, groups of buildings, whether separate or interconnected, are protected based on their architectural coherence, spatial organisation, and historical significance. Their designation as heritage implies the necessity of legal and administrative mechanisms ensuring their preservation, maintenance, and integration into sustainable urban planning policies (Wehdorn, 2020). States must uphold measures that prevent alterations from compromising their historical authenticity or architectural integrity (United Nations Educational, Scientific and Cultural Organization [UNESCO], 1972).

The legal framework for heritage protection now includes human-made and hybrid cultural-natural environments, such as archaeological landscapes, expanding state obligations to conservation, land-use regulation, and safeguarding traditional practices (Singh, et. al., 2023). The 1972 UNESCO Convention established structured mechanisms for enforcing international standards, ensuring monuments and sites with universal value receive legal protection (UNESCO, 1972).

The Council of Europe shaped heritage policy through conventions like the 1975 European Charter and the 1992 Valletta Convention, setting standards for architectural and archaeological heritage (Council of Europe, 1975; 1992). The 1975 Charter framed heritage as a historical expression, later expanding to include building ensembles for their collective cultural value (Council of Europe, 1975). The EU's heritage policy advanced after the 1992 Maastricht Treaty, which emphasised cultural diversity and shared heritage (European Union, 1992). The 1997 Decision No 2228/97/EC defined heritage broadly, covering movable/immovable assets and emphasising preservation as knowledge, accessibility, and conservation (European Parliament & Council, 1997). Post-1972, heritage expanded to include intangible elements, as outlined in UNESCO's 2003 Convention, which recognises living traditions and community-based safeguarding (UNESCO, 2003). This reflects heritage

as an evolving, dynamic process requiring adaptive legal protections (UNESCO, 2003; 2005).

The Lists of Intangible Cultural Heritage, as established by this Convention, and the Register of Good Safeguarding Practices serve as vital instruments in preserving and promoting cultural diversity across the globe. With 788 elements represented across five regions and 150 countries, the lists highlight the richness of human heritage and underscore the importance of safeguarding cultural expressions and traditions (UNESCO, 2025).

The 2023 Convention requires intangible heritage to align with international human rights standards, ensuring cultural protection does not violate fundamental rights like freedom of expression, non-discrimination, and participation in cultural life. Heritage practices must not justify human rights abuses or undermine equality and dignity (UNESCO, 2003).

The Convention promotes mutual respect among communities, linking cultural diversity to peaceful coexistence and sustainable development. Legal frameworks must balance heritage preservation with environmental and social sustainability, preventing exploitative practices (UNESCO, 2003). It identifies key domains for safeguarding intangible heritage, including oral traditions and language, which are vital for cultural identity and intergenerational transmission; performing arts, which require protection of tradition while encouraging innovation; rituals and festive events, which must be shielded from commodification; traditional ecological knowledge, essential for preserving environmental understanding; and craftsmanship, which should be supported through education and intellectual property laws (UNESCO, 2003). Legally, states must implement protective measures that respect community rights and human rights standards, ensuring inclusive and non-exploitative preservation (Blake, 2017).

2.2. Heritage and Society

As highlighted in the previous section, reflections on the relationship between heritage and society have significantly transformed in recent decades. While traditional understandings of heritage emphasised its material nature as a fixed artefact of the past, contemporary

interdisciplinary approaches increasingly regard it as a dynamic socio-cultural process (Harrison, 2013). Critical heritage studies underline that heritage is not a static set of objects but a continuously constructed and reconstructed phenomenon in the present, through which society actively selects, interprets, and reshapes the past (Smith, 2006). This shift from a static to a processual understanding of heritage underscores that meanings arise within the current social context and serve present-day needs and values (Emerick, 2014). Critical approaches to heritage emphasise discursive and constructivist perspectives. The Authorised Heritage Discourse (AHD) concept describes a dominant, expert-driven narrative that privileges monumental, aesthetically impressive, and allegedly authentic sites over every day and less visible forms of cultural expression. Critical reflection reveals that this traditional discourse creates a framework of power that determines what is considered worthy of protection—often at the expense of alternative or marginalised voices (Smith, 2006).

A new wave of critical heritage studies, which emerged around 2010, seeks to democratise the discourse. It significantly challenges European cultural heritage governance's traditional hierarchical (top-down) structure and emphasises communities' crucial role in heritage selection and management (Smith, 2016; Waterton & Smith, 2010; Crooke, 2010). This shift is particularly relevant for objects that may not hold major national significance, are not officially listed, and lack preservation by heritage authorities (Mydland & Grahn, 2012). These innovative approaches prioritise community engagement, empowering individuals to actively shape, interpret, develop, and value their heritage assets and narratives. This ongoing process transcends the mere preservation of the past; it involves the continual creation, recreation, and re-enactment of heritage in a dynamic social and political construction. A more inclusive and participatory framework can be fostered by redefining the relationship between communities and their heritage, which celebrates diverse voices and experiences.

This approach represents a significant shift in perspective, transitioning from a "model of cultural consumption" to one of "cultural commitment"—a change that is also supported by EU recommendations and policies (National Plan for the Arts, 2021, p. 6). As

the Porto Santo Charter articulates, heritage practitioners are encouraged to move towards an approach that "values what each individual knows, their traditions, and their unique voices" (National Plan for the Arts, 2021, p. 6). It emphasises that culture is inherent in every community and not imposed upon a territory. This understanding fosters a deeper connection to local heritage, recognising the complex fabric of existing cultural expressions. Alongside the shift toward more democratic cultural practices, heritage management and interpretation approaches are also evolving. Traditionally, expert institutions held authoritative control over what should be preserved and how it should be interpreted. However, this top-down model is now being complemented, and in some cases challenged, by participatory approaches that emphasise collaboration between professionals and the public (Waterton & Smith, 2010). Such models empower communities—residents of historic neighbourhoods, indigenous groups, or diasporic populations—to actively manage and interpret their heritage.

From a social and critical perspective, public participation is essential to democratising heritage by questioning dominant narratives and ensuring that overlooked or marginalised histories are brought to the forefront. Heritage serves as a vessel for collective memory, often evoking strong emotional and sensory responses while confronting complicated or contested aspects of the past (Smith, 2020). Involving local perspectives and traditional knowledge in heritage interpretation has enhanced authenticity and relevance, strengthening cultural continuity and identity (Stoughton, 2011). Moreover, civil society engagement—especially in regions with limited institutional support—plays a crucial role in safeguarding cultural values, demonstrating that sustained community involvement is the key to resilient and inclusive heritage preservation (Dhamo & Canaj, 2024).

These new governance approaches have developed alongside technological tools, including innovative communication methods for preserving and enacting cultural heritage. The field increasingly incorporates digital technologies that connect heritage with communities—crowdsourcing, digital educational tools, and virtual museums—which enhance community engagement and empower public participation. The intersection of cultural heritage and digital technologies is an area that the European Union has actively supported

through coordinated policies and funding initiatives. This commitment underscores the importance of leveraging technology to promote and preserve cultural heritage in a rapidly evolving digital landscape. 2021, 2021/1970/EU Recommendation was published (Official Journal of the European Union, 2021), emphasising the importance of implementing digital technologies in the cultural heritage sector. The Recommendation highlights the valuable contribution of heritage to economic growth, particularly in cultural and creative industries, and its potential to drive innovation through the integration of advanced digital tools. These technologies include 3D modelling, artificial intelligence, machine learning, cloud computing, data technologies, and virtual and augmented reality. Focusing on these tools enhances digital preservation and online access to heritage and positions it as a key driver in the broader digital transformation of society.

Recent studies suggest that digital technologies are increasingly recognised as powerful tools to reach wider audiences and open new research avenues (Munster et al., 2019). Furthermore, the use of websites and social media as part of dissemination strategies can effectively encourage the involvement of non-professional and non-academic users in digital heritage projects (Kokkala, 2024). Social networks also play a crucial role in enabling participation, fostering collaboration, and strengthening community engagement, as noted by Chowdhury (2015). Memory activism has emerged from within civil society, involving activists and grassroots initiatives that advocate for the recognition and remembrance of silenced or marginalised histories. This form of heritage activism frequently takes the shape of community-driven memorials, commemorative events, or campaigns aimed at protecting endangered heritage sites that remain outside the focus of dominant political and institutional agendas. The goal is not only to broaden the plurality of voices represented in the historical record but also to exert pressure on institutions to acknowledge the value of heritage diversity and to engage with these community initiatives on an equal and collaborative basis (Flinn, 2011).

As a result of these emerging trends, marginalised heritage—such as the cultural expressions of minority groups that historically have been overlooked or controversial sites associated with suffering—has gained increased visibility. This shift contributes to a

broader understanding of what constitutes shared heritage. However, it must be noted that heritage does not always function as a unifying force; it often becomes a site of controversy. Contested heritage refers to situations in which the meaning or use of heritage elements is subject to societal dispute. Distant heritage is one manifestation where different population segments ascribe opposing meanings to the same site or historical event (Tunbridge & Ashworth, 1996). In more extreme instances, disputes over historical interpretation can lead to the politicisation and manipulation of collective memory, as governments or other power structures selectively shape or distort historical narratives to legitimise their authority. Contemporary societies are witnessing ongoing debates regarding how to deal with controversial monuments and historical symbols—whether they should be removed, relocated to museum contexts, or reinterpreted through additional contextual information that acknowledges their problematic associations. These debates often involve statues of colonisers and controversial military leaders and naming streets or public buildings.

Contested heritage also encompasses dark heritage, which refers to sites and objects associated with tragedy, violence, and death. Holocaust memorials, former battlefields, and prisons exemplify such spaces, where the need for solemn remembrance intersects with the commercial pressures of tourism. This convergence raises ethical dilemmas about how to make these sites accessible to the public in a manner that is respectful and sensitive to their historical weight (Lennon & Foley, 2000; Stone, 2013). Another dimension of heritage conflict concerns social justice—specifically, issues of who heritage is preserved for and who ultimately benefits from it, particularly considering processes of commodification and gentrification (Salim & Rahman, 2022; Nurmaraya & Lukito, 2020). Commodification refers to transforming cultural practices and heritage into marketable products, thus influencing both the area and the communities. This can lead to beneficial and detrimental outcomes, such as local, sustainable development or turning culture into a commodity, which often results in a loss of authenticity, reflecting the tensions inherent in the commercialising culture. This dichotomy between authenticity and commodification is a recurring theme, especially in heritage sites where attracting tourists can overshadow genuine cultural practice.

Gentrification refers to the transformation of a neighbourhood through the influx of more affluent residents, often leading to the displacement of lower-income families and small businesses. This process typically changes the area's cultural and social character, housing market, and demographics. Gentrification results in a more privileged population (in terms of education wealth) that can afford new or renovated, more expensive homes. While gentrification improves infrastructures, increases the safety of the area, and, overall, revitalises the local economy, it also causes a loss of cultural diversity and a higher fragmentation of society with the displacement of the original residents. The increase in tourist flows often brings the side effect of gentrification, which manifests through a shift in the housing market to meet the needs of tourists at the expense of residents—such as the rise in short-term rentals and B&B accommodations. This is accompanied by increased luxury restaurants and shops catering to tourists, leading to changes in cities' social and cultural structure. This trend is evident in several historic and touristically attractive European cities, where gentrification spreads from central districts into peripheral neighbourhoods and surrounding areas (Tedesco et al., 2024).

In cities with high tourist concentrations, a sharp conflict arises between the needs of tourists and those of the local population. Locals, facing increasing housing pressure, rising prices, and a decline in accessible services, often feel marginalised and are pushed to relocate to less saturated areas. These transformations affect not only the physical space but also the demographic composition and cultural identity of urban districts, which begin to lose their original character (Almeida-García et al., 2021). In some cities, residents' attitudes toward tourism have shifted over the years—from an initially welcomed economic opportunity to a phenomenon negatively impacting their daily lives and quality of life (Russo & Scarnato, 2017). The impact of digital platforms for short-term rentals has also been significant, reshaping residential zones and how urban space is used. This leads to homogenising interiors and commercial spaces in specific historical centres according to globalised aesthetic standards—sometimes called the "IKEA effect" (Cerreta et al., 2020). Gentrification also affects university towns, where the presence of prestigious academic

institutions increases the demand for affordable housing. As a result, even students are being pushed out of city centres, altering the traditional social character of these areas.

2.3. Heritage and Nature

Contemporary understandings of heritage emphasise the strong interaction between human communities and their environments. Rather than treating natural and human elements as separate domains, current research approaches highlight their interconnection within ecological, social, and spatial contexts. Natural elements with cultural significance are an integral component of this system, as landscapes and ecosystems have evolved over centuries in close interaction with human activity. Increasingly, eco-cultural heritage is gaining prominence, emphasising the inseparability of cultural and natural heritage as an interconnected system shaped by ecological, historical, and social processes (IPT – Polytechnic University of Tomar, 2024). This perspective underscores the interdependence between human and natural systems and provides a new framework for the conservation and sustainable management of heritage in the face of global environmental challenges.

Historically, cultural and natural heritage have often been perceived as distinct categories, with conservation efforts focusing on monuments or nature reserves and ecosystems as isolated units. However, interdisciplinary research and a growing recognition of their interconnection have gradually dismantled this dualistic approach. As already mentioned in a previous section of this chapter, a pivotal shift in heritage conservation occurred with the adoption of the UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO, 1972), which introduced the category of mixed sites, emphasising the interrelation between natural and cultural values. Subsequently, the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (UNESCO, 2003) extended the concept of heritage to include traditions, rituals, and knowledge associated with the natural environment, reinforcing the need to protect tangible artefacts and cultural practices. In this context, cultural landscapes have become a crucial link between natural and cultural heritage (UNESCO World Heritage Centre, 2012). They are not static entities but dynamic systems reflecting historical, technological, and social

transformations. UNESCO currently recognises more than 120 sites officially classified as cultural landscapes.

This paradigm shift's core is eco-cultural (or biocultural) heritage, highlighting the intrinsic connection between biological and cultural diversity (Fu et al., 2021). Traditional knowledge and long-standing land management practices play a crucial role in preserving biodiversity (UNESCO & IUCN, 2023), while the erosion of cultural practices can disrupt ecological stability. This interdisciplinary approach integrates environmental sciences with the humanities, advocating for abandoning outdated dualistic conservation models that separate monument preservation from nature conservation (González, 2020).

The evolution of the heritage concept is closely linked to the growing environmental challenges, particularly the impacts of climate change (Aboulnaga & Abouaiana, 2024). Various strategies have emerged to adapt historical sites and structures to shifting environmental conditions. The novel concept of resilient heritage addresses the capacity of cultural sites to withstand environmental stressors while maintaining their function and symbolic significance (Seekamp & Jo, 2020). Similarly, climate resilience in heritage focuses on specific measures that enhance the ability of heritage sites to cope with natural hazards, ranging from sustainable reconstruction to integrating climate projections into management plans (O'Brien et al., 2015). Heritage adaptation further advocates linking cultural heritage conservation with climate policies. Notably, transformative heritage acknowledges that allowing specific sites to deteriorate under extreme environmental threats can be a lesson in cultural vulnerability (Seekamp & Jo, 2020).

Alongside these strategies, the emphasis on cultural sustainability and heritage has intensified, seeking to integrate modern technological innovations and community engagement with long-term heritage preservation (Fabbricatti et al., 2020). On an international scale, principles of climate-smart heritage management (Fatorić & Daly, 2023) and landscape-based approaches are increasingly applied, integrating cultural heritage conservation within broader ecosystem frameworks (Guzman, et. al, 2020). Combining environmental modelling with socio-economic analysis and multi-level vulnerability assessments has become essential for planning. Advanced technologies such as laser scanning

and photogrammetry enable precise monitoring of endangered sites, supporting more comprehensive conservation strategies (Aboulnaga & Abouaiana, 2024). This emerging holistic approach underscores the potential of cultural heritage as an active component in addressing climate crises (Woodside & Huggett-Jones, 2022). Traditional adaptation techniques, sustainable tourism models, and the adaptive reuse of historic buildings contribute to local economies while reducing environmental footprints (Besana, Greco & Morandotti, 2018). Active community participation in decision-making processes is now regarded as a fundamental prerequisite for ensuring the long-term preservation of cultural values and enhancing resilience to global challenges (Kirkegaard, 2020).

Ultimately, contemporary discussions on heritage increasingly integrate the preservation of physical artefacts with the support of community relationships, traditional knowledge, and sustainable land-use practices (Brumann, 2018). This shift underscores the growing need for a unified, ecologically and socially sensitive management approach. Modern heritage approaches, however, are progressively moving beyond anthropocentrism, incorporating a broader perspective on the relationships between human communities, the natural environment, and technological systems. Anthropocene heritage highlights humanity's role as a key ecological and geological agent, reflected in emerging new artefacts and phenomena—from industrial structures and plastic sediments to digital footprints (Appelgren, 2020). This discourse raises critical ethical questions: which elements of human impact should be considered worthy of preservation, how should they be studied in the context of ongoing transformations, and which values should guide their interpretation? (Fredengren, 2021). For instance, ecosystem conservation should not be limited to protecting "natural resources" for human use but should instead focus on safeguarding multi-species environments.

In contrast to the Anthropocene, characterised by cities, buildings, and infrastructure as dominant anthropogenic interventions in the landscape, the recently proposed utopian vision of the symbiote envisions human constructions in harmony with natural ecosystems through biomaterials, ecological design, and adaptive architecture (Albrecht, 2018). In this context, heritage would become less material and more process-oriented,

emphasising maintaining interconnected ecological and cultural relationships. Instead of static ruins, dynamic systems would emerge, naturally regenerating and evolving alongside ecosystems, thereby integrating human activity into the broader natural cycle.

This radical perspective, emphasising the interdependence of humans and nature, aligns with posthumanist thought, which introduces a fundamental shift in heritage discourse. It expands beyond human-made objects to include non-human agents—animals, plants, ecosystems, and intelligent technologies (Sterling, 2020). In this framework, "more-than-human heritage" recognises ecosystems, organic and inorganic elements, as co-creators of historical processes (Roudavski & Rutten, 2020). Similarly, symbiotic heritage (Hom & Penn, 2021) underscores the interconnectedness of cultural and natural structures while also addressing "unruly heritage", which includes sites affected by industrial pollution or natural disasters (Olsen et al., 2024). In practice, this new approach to heritage is reflected in efforts such as rewilding, which seeks to restore natural processes and original ecosystems in areas heavily impacted by human activity. Alongside preserving historical memory, these projects aim to enhance the natural dynamics of landscapes, allowing nature to regain equilibrium in concert with historical structures (Harrison et al., 2020).

This perspective reinforces the notion that heritage is not a static artefact of the past but a dynamic phenomenon in constant transformation, shaped not only by human actions but also by nature. This results in converging environmental management and heritage conservation, incorporating local ecosystems, historical layers, and diverse actors—from human communities to flora and fauna.

Interdisciplinary research highlights the role of cultural and natural heritage in promoting mental well-being by reducing stress, strengthening social cohesion, and fostering collective identity (Sayer, 2024). Therapeutic landscapes have emerged within this context, integrating natural elements, historical environments, and everyday urban or communal spaces. These sites are refuges, facilitating emotional and social interactions (Marques et al., 2021). Green spaces and high-quality public areas provide ecosystem services and connect individuals with local heritage, reinforcing a sense of belonging. Historical sites, from monuments to ancient parks, are thus incorporated into a therapeutic network of places

where physical experiences, symbolic meanings, and community activities intersect. The result is improved psychological well-being for individuals and the long-term resilience of social bonds rooted in shared cultural and natural heritage (Reece et al., 2022).

2.4. Conclusion

In response to the growing challenges of the 21st century, heritage protection has gained renewed significance. It is no longer understood merely as a remnant of the past but as a living and evolving process shaped by social, political, and environmental dynamics. Since 1945, UNESCO has been central in shaping this paradigm, establishing global frameworks for identifying, protecting, and managing heritage. However, these frameworks are being re-evaluated amid rising political tensions and scepticism in today's rapidly shifting landscape. Contemporary theoretical approaches increasingly emphasise heritage's plural, discursive, and negotiated nature. Meaning is no longer embedded in objects alone but emerges through an ongoing dialogue between communities, experts, and institutions. The shift from expert-led, centralised systems to participatory, community-based models reflects a broader democratisation of heritage and a recognition of previously silenced or marginalised voices.

This holistic perspective also acknowledges heritage as an active force in contemporary society—where cultural identity, collective memory, political power, community participation, and economic interests intersect. Heritage and society are inextricably linked: the past continues to shape the present as long as it is kept alive, and communities draw cohesion, identity, and future visions from the narratives they construct around it. At the same time, the boundaries between cultural and natural heritage are dissolving, giving rise to integrated eco-cultural approaches. In the age of climate crisis, heritage is not only at risk but also emerges as a tool for social resilience and environmental awareness. Concepts such as climate-smart heritage, adaptive strategies, and transformative heritage—which embrace accepting loss as cultural learning—reflect this evolving landscape. Posthumanist thinking further expands the notion of heritage, recognising the agency of ecosystems, technologies, and non-human actors in shaping historical processes.

These trends suggest that heritage should no longer be viewed solely as an object of protection but as a reflective, inclusive, and sustainable process through which societies seek to balance the past, present, and future. It is not only a form of memory but also a tool of collective imagination—and a means of responding to today's most pressing challenges, from ecological crisis to the need for coexistence in an interconnected world.

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3. Low-Density Territories

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3.1. Basic Definitions

Urbanistic parameters used in planning refer to population and/or building density to classify and regulate land use. These parameters are often used with various other indicators and indexes to understand urban environments comprehensively. Population density is typically quantified by calculating the ratio of the number of inhabitants to a specific area, which is usually expressed in terms of square kilometres or acres. For the purposes of this manual, the terms "low-density areas" and "low-density territories" will be used interchangeably, recognizing that while they may carry different nuances in academic and policy contexts, they both refer to regions characterized by low population density and related socioeconomic challenges.

However, according to Keryan et al. (2025) scholars, since World War II, have attempted to go beyond this indicator and developed a multicriteria approach, displaying other typical characteristics of low-density areas such as "(…) a weak economic density (GDP per capita, economic developments levels), both below national and European levels (…) [and] physical and relational distance to centres of decision-making." (Rosário & Madureira, 2022, p. 185).

There has been an attempt to accommodate the low-density concept under a multicriteria umbrella. Despite there is not a unique and legal definition of low-density regions, the concept has been used to leverage cohesion politics in the EU and the necessity of balance territorial/economic policies oriented for rural and depopulated areas and urban clusters, reducing disparities between the levels of development of various regions.

To support European Union (EU) territorial policies, Eurostat divided European territory into local and regional territorial typologies[1]. The LAU[2] (local administrative units) measure the degree of urbanization based on grid cells of 1 square kilometer. This typology (see Fig. 3.1) includes three categories: "cities, otherwise referred to as densely populated areas; towns and suburbs, otherwise referred to as intermediate density areas; and rural areas, otherwise referred to as thinly populated areas (Eurostat, 2024).

The structural funds of the EU operate simultaneously in rural and urban areas, but, according to Lopes & Mota (2021), the rural areas re-emerged more recently as a central issue for development policies, as they are facing declining populations, limited infrastructure, and restricted access to services and opportunities and features a GDP per capita below the European average.

The recognition by the European Parliament Committee on Transport and Tourism that some regions are facing "locational disadvantages, leading to low socio-economic development, and [having] historically witnessed less technological investments" (Bisaschi et al., 2021, p. 17) compels us to focus our attention on cultural heritage management in these areas. These communities often play a crucial role in economic sectors tied to cultural and natural landscapes and historical heritage. Recognizing and supporting their contributions can foster growth and development in traditionally overlooked regions.

3.2. The Importance of Cultural Heritage for Low-Populated Areas

Unlike densely populated settlements with abundant resources, low-density areas present unique opportunities and challenges for cultural heritage. Low-density areas are trapped in a vicious circle of scarce resources (financial, human, inadequate infrastructure) and underdevelopment. Scarce resources are considered a criterion for not developing the

[1] There are two legal typologies: Local typologies – which presents a range of typologies that are based on data for local administrative units (LAUs) and regional typologies – which presents a range of typologies that are based on regional data classified according to NUTS level 3. Eurostat's Territorial typologies manual, available in: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Territorial_typologies_manual_-_introduction

[2] This typology distinguishing between densely, intermediate and thinly populated areas. It was based on information for numbers of inhabitants, population density and the contiguity of local administrative units at level 2 (LAU2), otherwise referred to as municipality. available in: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Territorial_typologies_manual_-_introduction#SE_MAIN_TT

region in question, and the region cannot develop due to scarce resources. However, gamification that utilizes relatively limited resources and focuses on the historical and natural resources of the region can contribute to economic development. According to research, heritage management can support sustainable development and community resilience by strengthening local identity and promoting economic resilience through tourism and other cultural endeavours (Del Espino Hidalgo & Rodríguez Díaz, 2023; Fabbricatti et al., 2020).

In rural and low-density contexts, cultural heritage is vital for sustainable development, enriching local communities and preserving their unique cultural identities. As a novel method of promoting cultural heritage, gamification offers travel agencies and destination marketers the chance to design engaging and educational environments for effective brand recognition, engagement, and communication (Xu et al., 2021).

In addition, the conservation and restoration of cultural heritage in low-density areas present unique challenges and opportunities shaped by geographic isolation, demographic decline, and limited financial and human resources. Unlike heritage sites in urban settings, where funding, expertise, and tourism-driven revenue often support maintenance efforts, rural or sparsely populated areas must rely on alternative strategies. The reduced presence of skilled professionals, coupled with economic constraints, makes the sustainability of restoration projects more complex. Environmental factors such as exposure to natural degradation, insufficient infrastructure, and climate-related risks further complicate preservation efforts. Community involvement and adaptive reuse strategies become crucial, ensuring heritage conservation aligns with local needs and economic realities while preventing abandonment and decay.

Despite these challenges, low-density territories offer advantages that can contribute to more sustainable heritage management. The slower pace of development and reduced pressure from urban expansion often allow historical sites to retain their authenticity, free from excessive interventions. Traditional knowledge and craftsmanship, still preserved in many rural communities, provide valuable resources for restoration projects, maintaining historical accuracy and material integrity. Moreover, integrating heritage conservation with

local economic initiatives – such as cultural tourism, artisanal crafts, food tradition and agritourism – can create new opportunities for regional development. By fostering a sense of ownership among local populations and encouraging collaborative partnerships, these areas can transform their heritage into a dynamic asset, reinforcing cultural identity and long-term sustainability.

Considering cultural preservation and local sustainable development as the core objectives, terms such as cultural, creative, and industry have been defined under the umbrella of "cultural and creative industries" (Wu et al., 2023). Sustainable and slow tourism are the most prominent examples of the cultural creative industry. Recognizing cultural heritage as part of sustainable tourism development promotes economic opportunities while safeguarding local traditions and identity (Hoang, 2021).

Heritage sites and traditions often act as focal points for tourism, drawing visitors interested in authentic cultural experiences. The authentic features of rural cultural heritage, such as local architecture, traditions, and cuisine, also accelerate tourism. At the same time, low-density areas also may be advantageous for tourists who are environmentally responsible. This type of tourist is characterized as having more ego enhancement, more knowledge-seeking behaviour, and a highly educated group (Souza & Marques, 2024). Consequently, attracting highly educated and environmentally responsible tourists may positively affect the residents without the adverse effects of tourism. For instance, the gamification of the Pentati Pirate Trail treasure hunt, including geocaching, attracted more tourists to a small fishing village near Corfu, showing that even businesses in rural areas with low population density can benefit from it. This is because Generation Z, in particular, is looking for richer digital and often gamified tourism experiences (Skinner et al., 2018).

According to Tagowa and Hunohidoshi (2015), rural communities are increasingly recognized as key stakeholders in the sustainable tourism environment, enabling them to leverage their tangible and intangible cultural heritage for economic benefit. Especially in low-density territories and rural communities with important cultural heritage preserves and present it to outsiders. This influx can stimulate local economies, providing new job opportunities while simultaneously encouraging the preservation of cultural practices

and locations (Shcherbina & Salmo, 2023). Ibănescu, Stoleriu, Munteanu, and Iațu (2018), investigating the impacts of tourism on the post-communist Romanian rural areas, found that rural areas with more intensive tourist activity have significantly higher scores for all demographic indicators, indicating that they attracted significantly more new residents during the study period compared to territories with fewer or no tourists. On the other hand, a study in Malaysia shows that despite any type of tourism business offering opportunities to augment the conventional revenue stream, the advantages of tourism or even job openings spread only within the immediate area (Liu, 2006).

Gamification in low-density territories may pave the way to slow tourism. In more developed and industrialized countries, where modes of travel have become faster and more crowded, people often feel powerless, helpless, and dehumanized due to the struggle for speed. People's urge to 'slow down' may result from their mental resistance to the ever-accelerating rhythm of their lives, resulting in their desire to find ways to de-stress, slow down, and ultimately rejuvenate and enrich themselves. In this context, travelling – especially in slow and low-density territories – can provide a suitable channel (Oh et al., 2016). Low-density areas may serve as slow tourism destinations, and gamification may enhance the tourists' experience by making it more fun and informative. Gamification specifically designed for cultural heritage in low-density territories may, therefore, serve as a platform for playful participation and has the power to unite people around a shared experience. Therefore, gamification appears to be a potent instrument that can foster feelings of community, belonging, and ownership—all of which may enhance urban life and residents' quality of life (Thibault, 2019).

However, the interplay between the preservation of cultural heritage and sustainable tourism is multifaceted. While tourism can provide the necessary funds and awareness for heritage conservation, it can also damage cultural heritage if not managed carefully. Changes in the composition of floristic and faunal species, pollution, loss of authenticity, conflicts between the community and visitors, and changing the social structure of the villages are among the adverse effects of tourism in low-density areas (Kataya, 2021). Therefore, sustainable development practices should be considered from a perspective that

considers stakeholders with tourism strategies and sustainability principles. Taking local stakeholders into account in tourism practices can increase the cultural heritage elements that are presented and sustainably utilize intangible cultural heritage, such as traditional handicrafts, folklore, and local traditions. This can significantly enhance regional identity and attractiveness for visitors. These intangible assets can enrich the visitor experience, providing depth beyond physical spaces.

3.3. Socio-Economic Aspects of Cultural Heritage in Low-density and Management Strategies

Cultural heritage in low-density territories represents significant socio-economic potential while facing multiple specific challenges. Rural areas in the European Union cover approximately 83% of the territory and are home to about 30% of the EU population (European Parliament, 2022). Many of these regions struggle with economic decline, demographic shrinkage, and the degradation of historical and natural resources. Contemporary research emphasizes that heritage preservation is no longer limited to conservation but increasingly recognizes heritage as an active factor in regional development, adopting a holistic approach that integrates tangible and intangible aspects of culture, shaping local identities (Shakya & Vagnarelli, 2024).

One of the main challenges in managing cultural heritage in these areas is the lack of financial resources for restoration and maintenance. Public funding is limited, leading to a heavy reliance on state subsidies or short-term grant programs, which may not provide long-term sustainability (Klamer et al. 2013). In addition to financial constraints, weak infrastructure and limited accessibility to heritage sites hinder the development of tourism, which is one of the key economic opportunities for heritage utilization (García-Delgado et. al, 2020). Another pressing issue is demographic trends—rural areas often experience an outflow of younger generations, weakening local communities and losing the social capital necessary for heritage management (Gómez-Ullate et al., 2020).

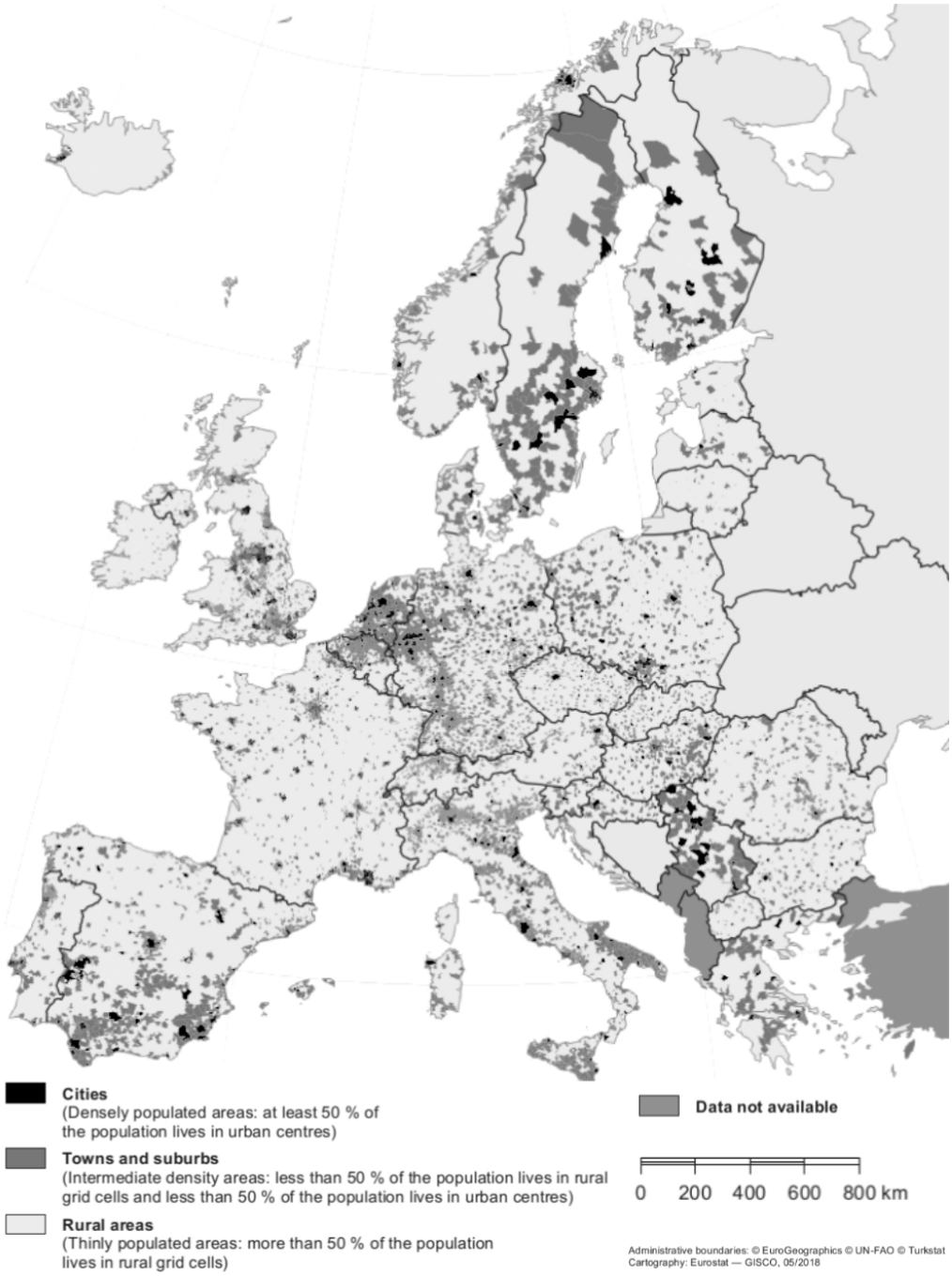

Figure 3.1.: Degree of urbanistation for local administrative units (Eurostat)

Cultural heritage can contribute to overcoming these challenges in several ways:

1. Tourism Development: Heritage tourism is a significant economic driver, attracting visitors interested in historical sites, cultural landscapes, and local traditions. Despite infrastructure limitations, strategic marketing and sustainable tourism practices can generate employment and stimulate local businesses (Richards, 2020).
2. Cultural and Creative Industries: Local artisans, craftspeople, and small enterprises can benefit from heritage-driven economic activities, such as traditional crafts, gastronomy, and cultural performances (UNESCO, 2018).
3. Job Creation and Skill Development: The preservation, restoration, and promotion of cultural heritage require specialized skills, offering employment opportunities in conservation, guiding, and hospitality sectors (OECD, 2019).

Several management strategies can help address these challenges. One practical approach is the prioritization and multifunctional use of heritage—historic buildings can be adapted for new functions (Shree et al., 2024), such as community centres or accommodations, generating revenue for their upkeep. Integrating heritage with tourism and the creative industries also plays a crucial role. Studies show that combining cultural activities with tourism can generate economic benefits even for small communities (Kostakis & Lolos, 2024). Additionally, a growing demand for authentic and less crowded destinations presents an opportunity for sparsely populated areas to attract specific visitor segments (Richards et al., 2025).

Innovative heritage management models include public-private partnerships, community-driven initiatives, and digital technologies. Collaboration between the public sector and private investors enables more efficient financing of heritage restoration, with recent trends also involving local community participation in decision-making and management (Boniotti, 2023). The concept of participatory management is based on the idea that experts, authorities, and residents should manage heritage with a historical and emotional connection. Digital technologies are another key element of modern cultural heritage management in sparsely populated areas. Digital tools such as virtual tours, 3D modelling, and augmented reality enable broader public access to heritage sites, overcoming barriers

of distance and accessibility (Garbin Praničević, 2021). During the COVID-19 pandemic, museums and institutions that had invested in digitization could maintain public interest and financial revenues despite travel restrictions (Terras, 2022).

Based on these insights, several policy recommendations can be formulated to improve cultural heritage management in sparsely populated areas. Integrated planning is essential, linking cultural policies with regional development, tourism, and education (Van der Auwera & Schramme, 2014). Another crucial factor is supporting participatory management models, where local communities and various stakeholders — including public and private organizations — actively contribute to heritage preservation. Ensuring financial sustainability is equally important—governments and municipalities should establish stable funding mechanisms that combine public and private resources, such as public-private partnerships, hybrid financial instruments (e.g., a mix of grants and private investments), and crowdfunding campaigns for community projects (Jelinčić & Šveb, 2021). Finally, promoting digitalization can significantly enhance the accessibility and economic value of cultural heritage, with practical solutions including shared digital platforms and technological innovations funded by public resources (Siliutina et al., 2024).

3.4. Conclusion

Cultural heritage in low-density territories holds significant potential to foster sustainable regional development, despite challenges such as demographic decline, limited infrastructure, and scarce resources. By integrating heritage preservation with creative industries, tourism, and community engagement – particularly through innovative tools like gamification – these regions can transform their cultural assets into engines of economic and social revitalization. Successful management depends on participatory approaches, stable funding mechanisms, adaptive reuse, and digital technologies. With coordinated policy efforts and stakeholder collaboration, low-density territories can not only preserve their unique identities but also thrive as vibrant, sustainable communities.

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4. Gamification

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Due to globalisation, societal change, and human and natural factors, heritage has long faced significant challenges (Garcia-Fernandez & Medeiros, 2019; Skovfoged, et al., 2018). Therefore, it is imperative to find and implement promising technologies, methods and means, such as gamification, that have revealed their potential for enriching heritage environments, preserving heritage (Rubegni, Blas, Paolini, & Sabiescu, 2010), engaging and involving more people and communities in protecting heritage assets and sites, improving understanding and appreciation of them among present and future generations, and creating a sense of belonging (Marques et al., 2023; Garcia-Fernandez & Medeiros, 2019; Petridis et al., 2013)

The term 'gamification' was first coined in 2002 and has gained relevance since 2010. Nowadays, gamification is among the most trending topics, and it is widely and successfully implemented in many areas to solve various problems. Even heritage has not gone unnoticed. The heritage field is a fertile area for applying various gamification tools, and many aspects of heritage work have been gamified. There is evidence for the successful application of gamification as a tool for heritage and destination marketing (Xu et al., 2015), tourism product design (Kim et al., 2021), safeguarding and preservation of tangible and intangible heritage assets (Wu et al., 2023), etc. Despite the wide use of gamification, there is still a misunderstanding about what gamification is and what is not.

4.1. Defining Gamification

There are many definitions and three main perspectives for defining gamification: designer-oriented, provider-oriented, and user-oriented (Hammedi et al., 2019). Most existing formal definitions conceptualise gamification from the **game designer's point of view**. These

definitions are stimulus-oriented, systematic, static, and elemental. They emphasise the game elements and rely primarily on the notion that gamification is the application of game design elements, game mechanics, game design techniques (Deterding et al., 2011), game thinking and design metaphors (Marczewski, 2013) to non-game context (Deterding et al., 2011). Gamification is much more than an infusion. However, these definitions truthfully reflect the main concerns of designers – functionalities, mechanics, and technologies.

Another dimension for defining gamification is the **provider's perspective**. Provider's perspective refers to making activities more game-like (Werbach & Hunter, 2012). Definitions that conceptualise gamification from the provider's point of view emphasise how providers will convert users' routines into ludic experiences. They are aim-oriented and dynamic. Providers are interested in the results outcomes. They face a challenge within a non-gaming environment, which is addressed by applying gamification. They define gamification as a process of integrating game dynamics, designing a strategy to induce users' motivation to perform activities (Filsecker & Hickey, 2014), driving users' involvement, experience, and engagement through game elements and game aesthetics rather than as a simple use of game elements in non-game scenarios.

The third dimension for defining gamification is the **user-centred perspective**. The user's perspective, summarised by Huotari and Hamari (Huotari & Hamari, 2017), makes the user a central actor in the gamified process and conceptualises gamification as a process of enhancing a product with motivational affordances for a gameful experience to facilitate and support users' overall value creation. This dynamic and response-oriented perspective focuses on the user's experience that gamification attempts to provide rather than on the gamification process itself. It notes that specific elements do not always result in a gameful design but rather from the user's experience (Insley & Nunan, 2014). These definitions are marketing-oriented and grounded on the understanding that to deliver customer value and achieve their market goals. Providers should consider their target group's needs, preferences, beliefs, motivations, habits, lifestyles, attitudes, etc., in their products' design, communication, distribution, and pricing.

Huotari and Hamari's definition (Huotari & Hamari, 2017) covers three key concepts related to gamification: motivational affordances, gameful experience, and value creation. Motivational affordances consider the structures and rules of gamification (stimuli). These are purposefully designed to provoke users' motivational needs and affect users' phycological states that lead to behavioural outcomes (Simões et al., 2013). Two types of motivations drive users' behaviour and actions: intrinsic and extrinsic. Intrinsic motivations are internal motivations to behave in a certain way for the sake of the behaviour and the inherent satisfaction this behaviour provides. People have a natural tendency to engage in activities they consider as interesting and playful regardless of reward contingencies. Intrinsic motivations have a long-term influence on user's behaviour. Extrinsic motivations consist of pursuing the behaviour for the external outcomes it may provide. The resulting behaviours are quick and intensive, but the continuous provision of incentives conditions them. Unlike intrinsic motivation, extrinsic motivation involves an external reward, social approval, or avoidance of punishment. Gamification should combine intrinsic and extrinsic motivations to increase user engagement and involvement.

Gameful experience refers to the intrinsically motivating user experience when interacting with the stimuli (gamified settings). The user's interaction with the stimuli is voluntary, not automatic. Although gameful experience could be influenced by the rules, structures, and mechanisms imposed by the designer, it remains subjective and unique to each user and emerges from the user's experience.

Value creation indicates the potential psychological and behavioural outcomes generated when users recombine the elements to form their own experience and engage with direction toward a focal object.

The three perspectives in defining gamification have their significance and relevance. Three parties – designer, provider, and user – can try to shake their hands in conceptualising gamification by referring to the dynamic, process and strategic orientation of gamification and its motivational power to generate experiences and lead to psychological and behavioural outcomes.

Gamification in heritage could be defined as a craft, a process of purposeful strategic integration of a few motivationally targeted game elements and game aesthetic in a non-game context or scenario, where the interaction between the game mechanisms and personal disposition result in a fun and enjoyable experience (Tobon et al., 2020), to foster motivation, engagement, and involvement with heritage problems and goals.

In addition to the many definitions, there are widespread misconceptions and myths about gamification.

Gamification and games are not the same. Gamification is usually intermixed with games. Gamification is about gaining knowledge from games and thoroughly applying it to address challenges within non-game domains. It does not concern just learning about games themselves. Gamification is about understanding what makes the game victorious, engaging, and captivating, what games can or cannot do, what the power of the games is, and how they can be used (Deterding et al., 2011).

Games are designed for entertainment and leisure to provide enjoyment, relaxation, and achievement. Gamification attempts to harness the motivational power of games to trigger participation, persistence, and achievement. Gamification applies a few game design elements and game aesthetics in real-world situations for non-game purposes. It is designed to motivate a specific audience to achieve specific goals. While gamification can be fun, that is not the core focus. Unlike games where winning and losing are part of the game, losing could be impossible in gamification as its main objective is to foster users' motivation, engagement, and involvement. Games are an end in themselves, while gamification is a means to an end. Gamification is a strategic tool that transcends traditional gaming, tapping into deep human motivators. Gamification includes motivators for everyone regardless of age, gender, race, or culture. It triggers universal human motivators, not just for generations who grew up with video games.

Gamification is technologically demanding. Gamification is not bounded by technologies or the need to be delivered online. It should not be digital, as well. Technologies are enablers, not prerequisites. They can add value and make the experience more engaging, immersive, and memorable.

A better understanding of gamification requires more than just knowing what gamification is or is not. It also requires conceptualised gamification elements or the so-called gamification toolkit. Werbach and Hunter (Werbach & Hunter, 2015) designed a pyramid structure of three levels, which is intended to provide some sense of how the different kinds of elements or pieces from games can be applied in different ways to provoke users' motivational needs and achieve a specific goal. The three levels are game components at the bottom, game mechanics in the middle, and game dynamics at the top (Figure 4.1).

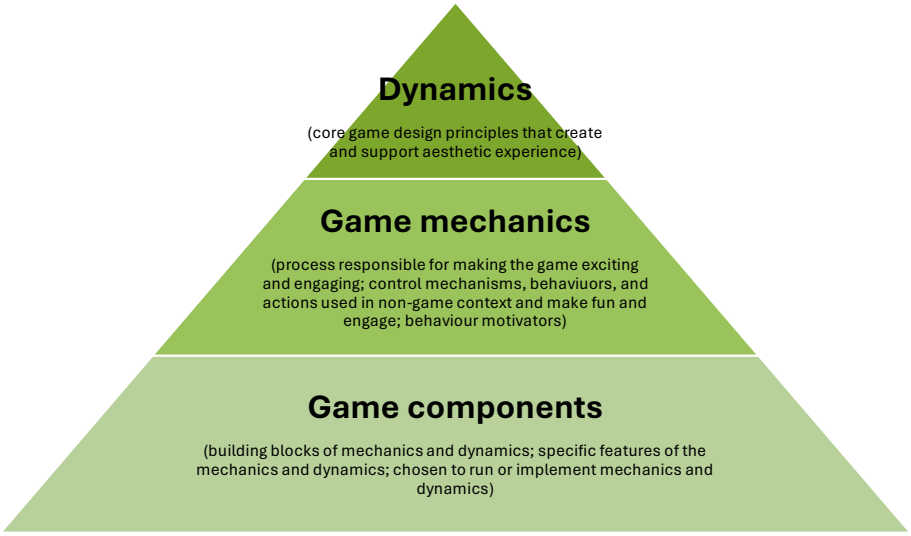

Figure 4.1.: Pyramid of game elements (Source: Werbach & Hunter, 2015)

4.1.1. Game Components

Game components form the foundational building blocks that bring game mechanics and dynamics to life within gamified systems, serving as the tangible tools designers use to achieve specific engagement goals (Werbach & Hunter, 2012). These elements - initially developed for games but later adapted for broader applications - create interactive environments that boost user motivation, facilitate goal achievement, and foster collaboration when adequately implemented (Alt, 2013; Záhora, 2013). At their core, game components translate abstract motivational principles into concrete features that users can see and interact with. The most impactful components include points (quantifiable rewards for completing actions), badges (visual representations of achievements), levels (tiered progression systems),

challenges or quests (structured tasks with clear objectives), leaderboards (competitive rankings that show relative performance), and limits (constraints like time restrictions that add tension and balance). These elements work synergistically to address different motivational drivers - points and levels provide a sense of progression, badges offer recognition, and leaderboards tap into competitive instincts. At the same time, challenges and limits create engaging obstacles. When thoughtfully combined, these components transform ordinary activities into compelling experiences that maintain user interest over time, encouraging continued participation and making working toward goals more enjoyable and rewarding. The effectiveness of any gamified system depends on selecting and implementing the right combination of these components to align with the specific context and desired outcomes.

Points. Points are frequent gamification elements that measure and reward progress toward goals, motivating users through quantifiable achievements. In cultural heritage contexts, they can be earned by visiting museums, attending events, or completing educational modules, then redeemed for rewards like tickets or discounts (Charvátová, 2021). Zichermann and Cunningham (2011) identify five types: non-decreasing experience points for progress tracking, exchangeable points (virtual currency), skill points for side activities, karma points promoting sharing, and reputation points for establishing trust between users.

Levels. Levels or stages provide a sense of progression, of moving to a specific goal. They are an indication of achievements. Higher levels could be associated with higher status, expertise, and respect from the community. Levels represent user progression within a gamified system. Progressing to a higher level is often associated with new challenges and rewards (e.g. exclusive access to special exhibition meetings with experts), which keep users motivated and engaged.

Badges/Trophies. Badges serve as visual markers of user achievements, providing recognition for completing tasks like visiting heritage sites or attending workshops. According to Antin and Churchill (2011), they fulfil five key functions: (1) goal-setting by marking specific objectives, (2) guiding users through system activities, (3) establishing a reputation

through demonstrated skills, (4) signalling status by displaying accomplishments, and (5) fostering group identification by creating shared symbols of achievement.

Leaderboards. Leaderboards display the ranking of users based on their performance. This feature encourages competition and motivates users to achieve better results. It can be considered one of the most important tools for educating and encouraging players. It is a specific evaluation system. It is a public space where players are recognised and rewarded. Zichermann and Cunningham (2011) distinguish two types of rankings: limiting and infinite. In the first, the order does not matter; the user is always shown with players with similar scores. In the case of infinite rankings, the player's position is always shown within all users of the system. It is important to define clear criteria conceived by the educational goals based on which the ranking will be created to design an effective ranking within the educational process.

Quests/Missions. Quests and missions are thematically packaged challenges that are defined ahead of time for users and must be completed to advance or achieve the goal. These are specific activities that users must complete. In cultural heritage, challenges can be designed to motivate users to discover lesser-known sites, attend cultural festivals, or engage in volunteer activities to protect cultural heritage. These elements provide structure and goals that users can achieve, increasing their engagement and motivation.

Content unlocking. Content unlocking is considered a reward for new content accessible or revealed when a specific goal is achieved.

Avatars. Avatars uniquely identify users and play the role of a bridge between the real-world individual and the digital universe. Avatars could be static images or 3D characters.

The above-presented list of game components is not exhaustive. The success of gamification depends not on the number of game components but on their cohesion and congruence with the intrinsic and extrinsic motivations they should drive. These fundamental gamification elements are key to creating an effective and engaging gaming environment, but even when using them, there are several obstacles. For example, as Chou (2015) and Marczewski (2013) state, the true meaning of using points and badges

is not always understood, and their use is meaningless when the user receives them, for example, for simply logging in without any effort. Another negative feature is the inadequate assessment of the work done and the reward amount. The user must always know for what purpose he collects points and badges because collecting them would lose meaning (Marczewski, 2013).

4.1.2. Game Mechanics

Game mechanics represent the core of the game. They define the game's rules and how the player will interact with it. While aesthetics and narrative provide the "skin" of the experience, mechanics are the skeleton—without them, even visually stunning systems fail to engage (Schell, 2020). Without good mechanics, any game, even artistically inspired ones, could be monotonous and unappealing. Making good game mechanics requires the developers to consider all the possible intricacies and interactions the player can make with the environment.

While developing game mechanics, developers should take into account multiple factors. For example, mechanics should consider the game's spatial and temporal features. This means the actual place where the players engage in their activities matters. Also, the time spent within the game should be considered. While developing game mechanics, the interactable objects have a fundamental role in how players interact with them or, generally, the possible actions that can be performed. All of this should be under a set of rules. Players should not be able to do whatever they want, but thanks to well-defined rules, they can be entertained. The rules improve the players' skills, keeping them in the game flow and allowing them to feel challenged. Nevertheless, a good amount of chance keeps the experience uncertain enough to surprise the players.

Game mechanics are the verbs of the gamified system that drive action forward and generate involvement. They are the motivators of behaviour. The common types of game mechanics, according to Werbach and Hunter (2015), are:

Challenges serve as the backbone of engagement in gamified systems, structuring tasks that require players to expend effort—be it cognitive (e.g., solving historical puzzles), physical (e.g., completing timed museum tours), or creative (e.g., designing virtual exhibits).

Rooted in goal-gradient theory, which posits that motivation intensifies as players approach objectives (Kivetz et al., 2006), challenges thrive when scaffolded to balance difficulty and accessibility. For instance, Duolingo's tiered language exercises begin with simple vocabulary matching and escalate to complex sentence construction, ensuring incremental mastery. Effective challenge design incorporates variety (blending puzzle types to cater to diverse learners) and narrative relevance (e.g., framing tasks as "rescuing artefacts" to enhance emotional stakes). Overly simplistic challenges risk boredom, while challenging ones may frustrate; thus, dynamic adjustments such as adapting quiz difficulty based on player performance—can sustain flow states (Csikszentmihalyi, 1990).

Competition leverages social comparison (Festinger, 1954) to drive engagement through rankings, leaderboards, or head-to-head matches. While competition can boost effort—seen in apps like Strava, where cyclists vie for segment records—poorly implemented systems risk alienating lower performers. Designers employ tiered brackets (grouping players by skill level) or ephemeral competitions (e.g., 24-hour leaderboards that reset) to mitigate this. The research underscores that competition works best when paired with cooperative elements, such as team-based rankings in corporate training programs, where departments internally collaborate while competing externally (Hamari et al., 2017). Crucially, competition should emphasise self-improvement; features like "personal best" benchmarks allow users to compete against their past performance, reducing discouragement.

Cooperation. Mechanics foster collective achievement by aligning with the human need for relatedness (Deci & Ryan, 2000). Examples include Wikipedia's edit-a-thons, where users collaboratively improve articles, or fitness apps that let teams pool steps to unlock rewards. Successful cooperation design hinges on interdependence—tasks requiring diverse skills (e.g., one player researching heritage sites while another drafts promotional content)—and transparent progress tracking (e.g., shared progress bars). Altruistic incentives, such as "helper badges" for mentoring newcomers, reinforce prosocial behaviour. However, cooperation risks "free riding," where some members contribute minimally; countermeasures include individual accountability metrics (e.g., highlighting each member's contributions) or peer-evaluation systems (Kollock, 1998).

Feedback. Acts as the system's communication channel, offering players real-time data on performance. Immediate feedback (e.g., "Perfect! +10 XP" for a correct quiz answer) strengthens behavior-reward linkages, while delayed summaries (e.g., weekly progress emails) provide reflection opportunities. Granular feedback—such as Khan Academy's skill heatmaps showing knowledge gaps—helps users self-correct. Negative feedback should be growth-oriented; instead of "Wrong answer," systems might say, "80% correct! Review medieval history to improve." Neuroscientific studies highlight feedback's role in dopamine-driven learning; unpredictable positive feedback (e.g., surprise bonuses) amplifies engagement (Schultz, 2016).

Rewards – from points to unlockable content – externalise achievement but require careful design to avoid undermining intrinsic motivation (Deci et al., 1999). Effective rewards are meaningful (e.g., badges tied to real-world skills), progressive (e.g., LinkedIn's profile-completion meter), and occasionally unexpected (e.g., "bonus streaks" for consistent use). MyFitnessPal's "Maintenance Badges" exemplify rewards aligned with long-term goals (health habits). Rewards should transition from frequent early wins to rarer high-value milestones, gradually shifting focus from extrinsic to intrinsic satisfaction to prevent overjustification effects (Ryan & Rigby, 2020).

Challenges, competition, cooperation, feedback, and rewards are the only parts of the puzzle called game mechanics. Game mechanics are the means for implementing one or more game dynamics. For example, challenges and rewards are means of progression. Cooperation and competition represent types of relationships.

4.1.3. Game Dynamics

Game dynamics represent the foundational, often invisible forces that shape player experiences in gamified systems. Unlike explicit game rules, which serve as surface-level guidelines, dynamics operate as the underlying architecture that gives coherence and depth to gameplay (Werbach & Hunter, 2015; Tondello et al., 2019). These macro-level elements cannot be directly implemented like mechanics or components but must instead emerge organically through thoughtful design.

Constraints introduce deliberate boundaries that force players to strategise, prioritise, and innovate. By limiting resources, time, or options, constraints create tension and challenge, transforming mundane tasks into compelling decisions. For example, a time-bound quest in a heritage app might require players to visit three monuments daily, incentivising planning and efficiency. Constraints also foster creativity; when players encounter obstacles like limited "energy" to perform actions, they explore alternative pathways to progress. Well-designed constraints prevent systems from feeling trivial or overwhelming, maintaining what psychologists call the "flow state"—the balance between skill and challenge that maximises engagement (Csikszentmihalyi, 1990).

Emotions are the visceral drivers that connect players to the experience. Gamification harnesses feelings like curiosity (e.g., uncovering hidden artefacts in a virtual museum), joy (celebrating achievements with celebratory animations), or friendly competitiveness (climbing a leaderboard). However, emotions extend beyond rewards: frustration at a near-miss can fuel determination, while pride in mentoring a peer reinforces prosocial behaviour. In educational contexts (as explored in Chapter 7), emotions like wonder—triggered by narrative reveals—or autonomy—through creative expression tools—can deepen learning. The key is intentionality: designers must anticipate emotional arcs, using mechanics like surprise unlocks or narrative twists to sustain emotional investment without manipulation (Lazzaro, 2009).

Relationships transform solitary play into social ecosystems. Whether cooperative (team challenges to restore a digital heritage site) or competitive (duels for top curator status), social interactions satisfy innate human needs for belonging and recognition. Status dynamics—like titles or exclusive perks for top contributors—tap into prestige motivation, while altruistic features (e.g., donating points to help others unlock content) foster community. Platforms like Duolingo exemplify this by pairing leaderboards with "clubs" where learners celebrate peers' progress. Crucially, relationships are not just player-to-player; designer-to-player relationships matter too. Personalised feedback (e.g., a chatbot guide praising a user's museum curation) can build trust and loyalty, mirroring the parasocial bonds in streaming communities (Rogers, 2020).

Progression in gamification creates a sense of forward momentum, giving users tangible evidence of improvement through systems like points and levelled achievements (Deterding et al., 2011). Gradually increasing task difficulty sustains engagement as players master skills incrementally—a design Kapp (2012) emphasises as critical for maintaining attention through structured sequencing. This principle aligns closely with educational scaffolding, a constructivist approach pioneered by Bruner (1978), where learners receive tailored support to tackle progressively complex challenges they could not solve unaided. Just as game progression balances difficulty to avoid frustration, scaffolding provides temporary frameworks (like mentor guidance or segmented tasks) that are gradually removed as competence grows. This dual-phase system—ramping up challenges while offering adaptive support—not only helps learners overcome skill gaps but also mirrors gamification's core strength: transforming potential setbacks into motivating milestones. When applied to education, such structured progression boosts competency development and intrinsic motivation by ensuring tasks remain neither stagnantly easy nor discouragingly hard, thereby optimising the learning curve (Kapp, 2012; Deci & Ryan, 2008; Deterding et al., 2011).

The narrative is the unifying framework that transforms disjointed game elements into a cohesive experience, giving users a sense of purpose within a larger storyline. By embedding storytelling into gamification, designers forge emotional connections between players and the game world—a critical factor for engagement, according to Zichermann and Cunningham (2011). In educational contexts, narratives enhance learning by contextualising abstract concepts (Stott & Neustaedter, 2013): relatable characters foster identification, while plot structures help students retain information and discern connections between topics. Though not all gamified systems require elaborate plots, minimalist narratives are a guiding thread ("fil-rouge") to sustain motivation. Importantly, narrative works synergistically with aesthetics—where purposeful sound design and stylised visuals (not necessarily hyper-realistic) deepen immersion far more than technical complexity. These elements elevate gamification beyond mechanical rewards, creating memorable experiences that drive meaningful engagement with educational content and gameplay objectives.

Game dynamics represent the interaction between game mechanics and the player, creating the overall gaming experience. These game elements, which the player encounters and often designs themselves (Záhora, 2013; DaCosta & Kinsell, 2023), include various aspects that can change during the game and influence the player's experience. These aspects include difficulty, game pace, game objectives, rewards, and team support. Game dynamics stem from the user's need for recognition and reward, aiming to evoke emotions. It is possible to create interactive and engaging educational materials that are attractive and motivating for users through game dynamics.

4.2. Types of Players

The final fundamental element to be considered while designing a game is the addressed type of player. Nowadays, players are heterogeneous and may differ in age, cultural background, and previous experiences. Developing a game that satisfies everyone in the world is an impossible task. A good game should target only a specific group of players to create the ideal experience for them. The first category to be considered is the demographics of the players. Age and gender influence the decision of what type of game will be developed. Indeed, younger audiences find amusement in colourful and simple games, such as Minecraft or Roblox, while adults may be interested in more profound games. On the other hand, gender also can influence the development process. Of course, nowadays, males and females play the same games, but some characteristics are inherent in men, while others are inherent in women. These "stereotypes" should not be considered as a way to discriminate between the two groups; instead, they should guide the design process to include everyone (The Gaming Mecca, n.d.).

The game design process should also take into account what players find pleasurable (Gallego-Durán et al., 2019). Two taxonomies can be considered. The first one has been theorised by game designer Marc LeBlanc, who identified eight possible kinds of fun (Hunicke et al., 2004). For example, players may be interested in challenging games, while others are more excited to experience meaningful narratives and story-driven adventures. On the other hand, the second taxonomy was developed by Richard Burtle (1999), who

identified four types of players based on two axes. In the first one, acting-interacting, the player decides to take action against a specific thing or interact with it. The other one, world players, defines the target of the interaction. From the different combinations, the four types of players are derived. The typology of players of gamification applications is important for effectively using gamification techniques in education and promoting cultural heritage. Each player is unique (Figure 4.2), with their motivation to play any game and develop a personal approach to its ecosystem. Marczewski (Marczewski, 2013) proposed six archetypes of users which differ in the degree to which they can be motivated by either intrinsic or extrinsic motivational factors (Figure 4.2). As each archetype is motivated by different things, the heritage gamification system should be based on game components that support these motivators and, therefore, could ensure engagement and involvement.

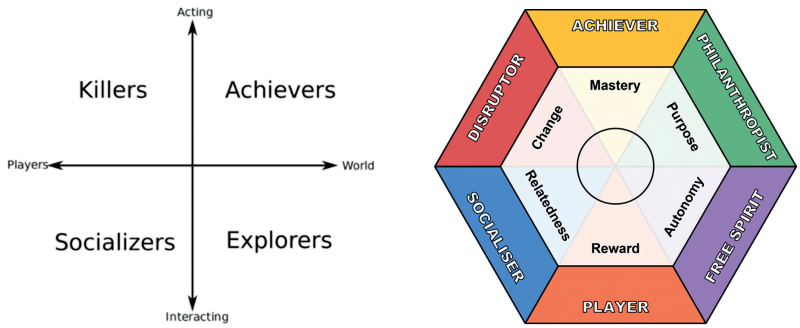

Figure 4.2.: The main typologies of players and their characteristics - Bartle (1996) and Marczewski (2018)

The vertical axis in the Bartle Player type chart above shows the prioritisation of control versus content or acting versus learning about the game's universe and connecting with other players. The horizontal axis shows the prioritisation of engaging with other players versus acting or controlling the activity within the game itself. Bartle's (1996) typology was followed up and expanded by Marczewski (2013), who works with the following types of actors:

- **Achievers:** These players are motivated by achieving goals and earning rewards (Marczevski's typology refers to **Players**). In cultural heritage, they may be motivated by collecting points for visiting monuments, earning badges for completing

educational modules or advancing to higher levels for participating in cultural events. Gamification components appropriate for achievers are competition, leaderboards, choice, level, quest, missions, and challenges.

- **Explorers:** Explorers are motivated by discovering new things and gaining knowledge. These players may be attracted to challenges and quests that lead them to discover lesser-known landmarks, participate in workshops, or explore virtual replicas of historical sites. Marczevski (2018) refers to this type of player as **Free Spirit**. Their intrinsic motivation is expressing themselves, freely acting, exploring, and creating. Gamification components appropriate for free spirits are unlockable content, feedback, choice, and level.
- **Socialisers:** These players are motivated by social interaction and collaboration with others. Their intrinsic motivation is to interact with others and build strong social connections. They aim to foster relationships, create a sense of community, and are interested in interaction. In the cultural heritage arena, they may be motivated by team challenges, collaborative activities, or sharing their achievements on social media. Gamification components appropriate for socialisers are cooperation, competition, choice, level, challenge, prize and leaderboards.
- **Killers:** Competitors are motivated by competition and dominance. These players may find leaderboards that can compare their results with others and competitions that motivate them to perform better.
- **Philanthropists:** These players are motivated by helping others and contributing to the greater good. They are intrinsically motivated to give to others and contribute to heritage preservation, even without expecting a reward. They have an altruistic behaviour. Gamification components appropriate for philanthropes are collection, knowledge sharing, challenge, voting, levels, choice, and cooperation. In the context of cultural heritage, they may be motivated by volunteer activities that contribute to preserving and promoting cultural heritage or by challenges that encourage community collaboration.

- **Disruptors:** Disruptors are motivated by change. Their extrinsic motivation is to disrupt the system, to test its boundaries and to improve (or not) the system. They like challenges. Gamification components appropriate for disruptors are competition, choice, level, prize, and voting.

Different types of players respond to different game elements and motivations, which need to be considered when designing gamified systems. When designing gamified systems to promote cultural heritage, it is important to consider these types of players and their motivations. However, assessing and accommodating every personality type in every aspect of the game is almost impossible, so it is necessary to step back, organise and plan things out. This can create an effective, compelling, and engaging gaming environment that appeals to many users and encourages their engagement in cultural heritage activities.

4.3. Challenges of Gamification

Gamification applies game-like elements to non-game contexts, offering benefits in sustainability, education, tourism, and more. However, its implementation faces technical, ethical, economic, and legal challenges.

4.3.1. Limitations of Gamification

- **Declining Engagement:** Repetitive mechanics (e.g., leaderboard, badges) can reduce intrinsic motivation over time (Dah et al., 2024; Shahri et al., 2019). Regular updates can help, but small organisations often lack resources (Mirzaie Feiz Abadi et al., 2022).
- **One-Size-Fits-All Pitfalls:** Ignoring user diversity—cultural norms, generational differences (e.g., Gen Z vs. older users), or personality types (e.g., introverts vs. extroverts)—can hinder effectiveness (Buckley & Doyle, 2017; Singh, 2025). Competitive designs may also demotivate low performers or exacerbate stress, particularly among women in fitness apps (Bai et al., 2024).
- **Oversimplification:** Overemphasis on rewards may trivialise complex tasks (e.g., medical decisions) or prioritise superficial engagement over meaningful participation (Singh, 2025).

4.3.2. Ethical Concerns

- **Exploitation Risks:** Gamification can enable unpaid labour (e.g., crowdsourcing) or "gold farming," where low-wage workers grind in-game assets (Cherry, 2011; 2012).
- **Unintended Consequences:** Poorly designed systems may foster cheating, stress, or resentment (Hanus & Fox, 2015). Forced workplace participation can reduce engagement (Hammedi et al., 2021).
- **Motivation Trade-offs:** Excessive extrinsic rewards (e.g., points, badges) may undermine intrinsic motivation, leading users to "game the system" (Anderman, 2023)).

4.3.3. Legal and Regulatory Issues

- **Labor Gray Areas:** Unpaid gamified tasks ("digital labour exploitation") and mandatory participation during off-hours raise legal questions (Ferrer-Conill, 2018; Kim, 2018).
- **Data Privacy:** Collecting sensitive behavioural data risks GDPR violations if safeguards are inadequate (Mirzaie Feiz Abadi et al., 2022). Transparency in data use is critical (Nyström, 2021).
- **Intellectual Property & Liability:** Unauthorised use of game mechanics or systems promoting addiction may lead to litigation (Journal of Organizational and End User Computing, 2019).

To address these challenges, organisations should prioritise human-centred design, regular audits, and transparent data practices. By balancing innovation with ethical and legal standards, gamification can become a sustainable engagement tool.

4.4. Conclusion

Gamification has emerged as a transformative approach across various domains, leveraging game design elements to enhance engagement and motivation in non-game contexts (Nicholson et al., 2015). While its potential in fields like education, cultural heritage, and business is undeniable, successful implementation requires careful attention to design

principles, user diversity, and ethical considerations. Effective gamification must balance intrinsic and extrinsic motivators, adapting game mechanics to specific user needs and contexts to avoid disengagement or exclusion. Understanding different player typologies - from achievement-driven to socially motivated users - is crucial for creating inclusive experiences, particularly in cultural heritage applications where personal connection drives meaningful participation. However, challenges remain in ensuring ethical deployment, including preventing exploitative practices, maintaining data privacy, and navigating legal complexities. The sustainability of gamification systems depends on continuous adaptation and human-centred design, especially for organisations with limited resources. When thoughtfully executed with interdisciplinary collaboration between designers, psychologists, and technologists, gamification can evolve beyond a passing trend into a powerful, enduring tool for fostering genuine engagement and achieving substantive goals across multiple sectors. These aspects of gamification and games will be revealed in the following chapters.

The future of gamification lies in addressing its inherent limitations while maximising its motivational potential. As the field matures, practitioners must prioritise transparency in reward systems, respect for user autonomy, and cultural sensitivity in design approaches. The tension between standardised game elements and personalised experiences presents an ongoing challenge, requiring innovative solutions that accommodate diverse user preferences without sacrificing system integrity. Technological advancements offer new opportunities for immersive gamification, but these must be balanced against concerns about accessibility and equitable participation. Ultimately, gamification's lasting value will be determined by its ability to create authentic value for users while maintaining ethical standards and adapting to evolving societal needs. By focusing on meaningful outcomes rather than superficial engagement metrics, gamification can fulfil its promise as a versatile strategy for motivating behaviour change and enhancing user experiences across numerous applications.

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5. Tools and Technologies

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Nowadays, many technological solutions have been proposed to develop software. Due to the possible integrations (Thomas & Nejmeh, 1992) among said technologies, it is important to recognise which tools and technologies are suitable for a specific software group. For example, while developing back-end solutions (Sharma et al., 2024), it is fundamental to know how the server should be developed (e.g. using Python or Node.js) or how the database should be implemented (e.g. relational, non-relational, or cloud). Additionally, the knowledge of these tools could prevent eventual financial losses. Indeed, among all the possible causes (Charette, 2005), wrong choices or underestimations during the tool selection process (Bruckhaus et al., 1996) may profoundly affect software development.

Gamified apps are no strangers to this problem. Of course, gamification does not strictly refer to developing digital applications: gamification techniques also work without digital support and rely on motivating the end user to accomplish tasks through a gameful environment. However, combining digital tools with gamification techniques has been proven to be an effective solution (Vrcelj et al., 2021) to educate end users.

This manual chapter presents an overview of the available tools and technologies to inform the reader about the possible solutions for developing gamified applications. The possibilities for developing apps are countless, and trying to understand how each tool works and how it can be integrated with others can be overwhelming. The overview discussed here should be considered as a list of tools and technologies and a first step to understanding what can be used and when it should be used.

The chapter is divided into four sections. In the first one, Technical Feasibility Analysis is discussed. The second section is related to the types of applications that can be produced in a gamification context. Then, a group of meaningful tools is introduced. These

are discussed to understand how they can be used to make gamified applications and how they integrate. The final section introduces the best technologies for improving gamified experiences.

5.1. Technical Feasibility Analysis

Technical Feasibility Analysis (Dey, 2001) is essential in developing applications. It focuses on analysing the environment in which the software will be deployed and the accompanying infrastructure. It is a key step in the initial phases of the software lifecycle, aimed at assessing whether a given project is technically feasible with the available technologies, resources, and infrastructure. This analysis helps minimise risks, set realistic timelines and budgets, and avoid costly mistakes before starting development. In many technical requirements, "modern" technologies and methods are often requested without considering their applicability to the specific situation and environment.

Gamification is an iterative process that requires constant care and adjustments to the players' current needs and the company's strategic goals with the current needs and company strategic goals and analysis of the results obtained and the company's strategic goals. For effective implementation, it is necessary to regularly monitor the metrics, motivation, and engagement of the players, analyse the results obtained, and, based on them, make appropriate adjustments or changes that align with the educational goals.

When considering a gamification strategy from the perspective of player-centred design (Kumar et al.., 2013), it is crucial for the player to first thoroughly understand the future players. This knowledge then shapes the entire design process and influences the final form of the gamification. The analysis focuses on several main aspects, beginning with identifying the user context, which includes defining end users, their devices, and network connectivity. Next, the infrastructure is assessed, covering servers, network security, and compatibility with external systems. Technological requirements are then evaluated to select suitable architecture, frameworks, and libraries, while hardware resources—such as computational power, available sensors, and environmental factors—are analysed. Risks

and constraints are also examined, including legal regulations, budget limitations, security concerns, and sustainability.

Additionally, scalability options are reviewed to ensure the system can accommodate growing user numbers and future maintenance, which is particularly important for projects funded by programs that later require organizational self-sufficiency. The analysis is carried out in structured steps: first identifying functional and non-functional requirements, then assessing available technologies, evaluating hardware, software, and human resources, analysing risks with mitigation strategies, and estimating project timelines and complexity. Finally, a technical feasibility report is prepared, presenting possible solutions with pros and cons, recommended architecture and technologies, risk assessments with mitigation plans, projected timelines and budgets, and the necessary expertise and human resources required for successful implementation.

5.2. Types of Applications

A complete classification of application types can be made based on various criteria, such as platform, architecture, functionality, and more. Table 5.1 includes a detailed classification, along with the advantages and disadvantages of each type in the context of developing an application (e.g., a game) that promotes cultural and historical heritage.

Choosing the right platform for developing an application that promotes cultural and historical heritage depends on the project's goals, target audience, and available resources. Desktop applications excel in performance and graphical fidelity, making them ideal for high-quality 3D historical simulations. Mobile apps offer broad accessibility, leveraging AR and GPS for interactive, location-based experiences. Web-based solutions provide instant access and cross-platform compatibility, perfect for lightweight educational tools. Console games deliver immersive, high-end experiences with optimised hardware. At the same time, standalone VR creates unparalleled interactive environments for historical re-enactments and virtual tours—though at a higher cost and complexity.

Table 5.1.: By Target Platform

Platform	Description	Advantages	Disadvantages	Use Cases
Desktop	Installed and run locally on desktops/laptops (Windows, macOS, Linux).	– High performance (GPU/CPU access). – Full hardware control. – Better local data security.	– OS-specific versions needed. – Complex distribution/updates.	High-quality 3D historical games, immersive simulations, resource-heavy applications.
Mobile	Apps for smartphones/tablets (Android, iOS).	– Wide user reach. – Easy distribution (app stores). – Supports AR/GPS.	– Limited hardware. – Requires cross-platform support. – Lower graphics capability.	AR historical tours, location-based cultural guides, educational apps.
Web-based	Browser-accessed apps (HTML/JS/WebGL).	– No installation. – Cross-platform. – Easy updates.	– Limited GPU access. – Performance constraints. – Requires internet.	Quick-access educational games, interactive historical quizzes, lightweight demos.
Console	Apps for gaming consoles (PlayStation, Xbox, Nintendo Switch).	– High performance (optimised hardware). – Immersive experience.	– Platform-exclusive. – Strict distribution policies.	High-fidelity historical games, cinematic storytelling, immersive adventures.
VR	Dedicated VR hardware (Oculus Quest, Valve Index, Apple Vision Pro).	– Unmatched immersion. – Motion/haptic feedback. – Interactive 3D environments.	– Expensive hardware. – Smaller audience. – Complex development.	Virtual historical reenactments, archaeological site tours, first-person educational experiences.

Ultimately, the best platform balances engagement, accessibility, and technical feasibility. For maximum reach, a multi-platform approach (e.g., mobile + web) may be optimal, whereas specialised experiences (VR or console) can deepen immersion for niche audiences (see Table 5.2). Developers should prioritise their core objectives—education, entertainment, or preservation—to select the most effective platform.

Table 5.2.: By Architectural Approach / Structure

Architecture	Description	Advantages	Disadvantages	Use Cases
Monolithic	Single, unified codebase (back-end, frontend, DB).	– Simple initial development. – Fewer moving parts. – Easier deployment for small teams.	– Hard to scale. – Tight coupling (changes affect entire system). – Performance bottlenecks under high load.	Small to medium educational apps with stable requirements.
Client-Server (N-tier)	Separates client (UI) and server (logic + DB).	– Clear separation of concerns. – Easier maintenance than monolithic. – Better security (logic stays server-side).	– Requires stable internet. – Centralized (server downtime = app downtime). – Complex API management.	Multiplayer or social historical games with server-stored data.
Microservices	Decoupled, independent services communicating via APIs.	– Scalable (each service scales independently). – Teams work in parallel. – Fault isolation (one service failing doesn't crash the app).	– High DevOps complexity (Kubernetes, Docker). – Higher infrastructure costs. – Requires mature tech expertise.	Large-scale platforms with multiple features (user accounts, analytics, etc.).
Offline-Capable Client-Server	Hybrid: Server-managed but supports offline use with sync.	– Works offline. – Saves storage (downloads resources on demand). – Updates content without full reinstalls.	– Complex sync logic (conflict resolution). – Requires careful data planning. – Security risks for local data.	Educational/ historical apps with downloadable content (e.g., virtual museum tours).

The choice of architecture depends on scalability needs, team size, and connectivity requirements. Monolithic is cost-effective for simple apps, while Client-Server fits most standard applications. Microservices excel in large-scale ecosystems, and Offline-Capable designs ensure accessibility in low-connectivity scenarios (e.g., remote historical sites). For cultural heritage projects, hybrid models (e.g., offline-first with cloud sync) often provide the best user experience (see Table 5.3).

Table 5.3.: By Implementation Technology (Especially for Mobile Apps)

Approach	Description	Advantages	Disadvantages	Use Cases
Native Apps	Platform-specific (Android: Kotlin/Java; iOS: Swift/Objective-C).	**– Best performance.** **– Full hardware access** (camera, GPS, sensors). **– Seamless OS integration (UI/UX).**	**– Separate codebases per platform.** **– Higher cost & longer development.**	High-performance AR historical tours, immersive 3D reconstructions.
Cross-Platform (React Native, Flutter)	Single codebase for multiple platforms (JavaScript/Dart).	**– Faster development.** **– Lower cost (shared logic).** **– Large community & plugins.**	**– Slightly lower performance.** **– Delayed support for new OS features.**	Cultural heritage apps with moderate complexity (e.g., interactive museum guides).
Progressive Web Apps (PWA)	Web apps with offline/installable features (HTML/CSS/JS + Service Workers).	**– No app store approval.** **– Automatic updates.** **– Works across devices.**	**– Limited hardware access.** **– iOS restrictions.** **– Offline constraints.**	Lightweight educational tools (e.g., historical quizzes, virtual exhibitions).

The choice depends on budget, performance needs, and target audience:

- Use native development for resource-heavy, platform-specific features (e.g., AR/VR).
- Opt for cross-platform (Flutter/React Native) to balance cost and functionality for multi-OS deployment.
- PWAs are optimal for lightweight, web-first solutions where offline access is secondary.

For cultural heritage projects, hybrid approaches (e.g., cross-platform core + native plugins for AR) often strike the best balance.

5.3. Development Tools

Choosing the right technologies is crucial for the success of any game project, mainly when it focuses on such a specific topic as cultural heritage. Creating a game focused on cultural heritage is not only about entertainment but also about education. A game can serve as a tool for conveying knowledge about a specific region's history, culture and traditions. At the same time, it can contribute to the protection and promotion of cultural heritage and

support local tourism development. Modern technologies such as virtual and augmented reality can significantly enrich the player's experience. Virtual reality allows players to immerse themselves in historical scenes and explore monuments up close. Augmented reality, in turn, can connect virtual elements with the real world, for example, using mobile applications that guide players to interesting places in their surroundings.

On the other hand, using more advanced resources can make development more costly, longer and out of step with the "serious" purpose of sharing knowledge of history through gamification. The following steps should be considered when planning the technological aspect of the game and choosing the right tools for the job:

- **Flexibility:** The chosen technologies should allow for the creation a wide range of gaming experiences, from simple 2D adventure games to complex 3D worlds with virtual reality elements.
- **Compatibility:** The selected tools must support mobile platforms (Android and iOS) and other devices such as VR headsets.
- **Expanded capabilities:** Modern technologies constantly offer new features, such as artificial intelligence, machine learning, or cloud services, that can enrich the gaming experience.
- **Budget:** Some tools are free, others are paid. It is important to consider the financial possibilities of the project.
- **Learning Curve:** Each tool requires different efforts to be mastered. Developers should consider this aspect, together with the strength of the corresponding development community.

Regarding the technologies and digital frameworks to support the development of the game, we can separate them into two parts: the technologies related to the game engine, responsible for the central core of the game, and technologies to produce materials, such as modelling graphics, textures, sound effects, music.

Game engines are integrated development environments (IDEs) that streamlining game production across different platforms. They provide animation, physics, materials management tools, and more (Vohera et al., 2021). The choice of Engine and architecture

depends on the project's scope, technical requirements, and target audience. Popular free options include Unity 3D, Unreal Engine, Godot, CryEngine, and GameMaker.

Game engines provide integrated environments for creating interactive experiences across platforms. The optimal choice depends on project requirements, team size, and performance needs. In Table 5.4, key options have been analysed using comparative tables.

Table 5.4.: Leading Game Engines Comparison

Feature	**Native Applications**	**Web-Based Applications**
Performance	High (full hardware access)	Moderate (browser-limited)
Distribution	App stores/installation	Instant URL access
Development Cost	Higher	Lower
Offline Functionality	Full support	Limited (PWA possible)
Hardware Access	Complete (sensors, GPU)	Restricted
Best For	AAA games, AR/VR experiences	Casual games, educational tools

Native development delivers superior performance for graphically intensive projects, while web solutions offer broader accessibility with simpler distribution.

Unity balances capability and accessibility, while Unreal leads in graphical fidelity. Godot offers an entirely open-source alternative, and web frameworks enable lightweight development.

Table 5.5.: Asset Creation Tools

Category	**Professional Tools**	**Free Alternatives**	**Best For**
3D	Maya, 3DS Max	Blender	Character/environment design
2D	Photoshop	Krita, GIMP	Sprites/textures
Audio	Pro Tools	Audacity, LMMS	Sound effects/music

Professional tools offer advanced features for studios, while free alternatives provide capable solutions for indie developers. Despite its steeper learning curve, unreal Engine's photorealistic capabilities are ideal for high-fidelity historical reconstructions requiring advanced graphics. Educational projects with limited budgets may prefer Unity's balance of features and accessibility or web frameworks for purely browser-based experiences.

The asset pipeline should match the project scope: Blender for professional 3D work, Krita for 2D art, and Audacity for sound design to provide cost-effective solutions without sacrificing quality.

Ultimately, successful projects align their technical stack with both creative vision and practical constraints, whether prioritising cutting-edge visuals or broad accessibility. Hybrid approaches (e.g., Unity WebGL export) can sometimes bridge these requirements effectively.

The choice of game development technology depends on the project's scale, performance needs, and target audience. Native game engines like Unreal Engine and Unity excel in high-performance 3D graphics, VR/AR, and offline functionality, making them ideal for immersive, resource-intensive experiences. However, they require more significant technical expertise and investment.

For web-based games, modern frameworks like Three.js and Phaser offer a cost-effective, cross-platform solution with easy distribution—though they face limitations in advanced rendering and hardware access. Additionally, asset creation tools such as Blender (3D), GIMP/Krita (2D), and Audacity (audio) provide accessible options for developers at all levels. By aligning the Engine and tools with the project's goals, developers can efficiently create engaging cultural and historical gaming experiences.

Choosing the right game development platform or engine largely depends on the project's scope, target platforms, and performance requirements. Unreal Engine is often the best choice for high-quality, AAA-level projects with cutting-edge graphics and advanced physics due to its powerful rendering capabilities, photorealistic lighting, and robust toolset. On the other hand, indie developers or teams focusing on multi-platform games (mobile, PC, consoles) may prefer Unity thanks to its flexibility, user-friendly interface, and strong cross-platform support. For browser-based or lightweight games, web frameworks like Phaser (ideal for 2D games) or Three.js (great for 3D web experiences) are excellent options, as they allow for smooth performance directly in browsers without requiring heavy installations. Each tool has strengths, so the optimal choice depends on the project's specific needs, team expertise, and long-term goals.

5.4. Technologies for Gamification

Gamification has become an effective strategy for enhancing user engagement and motivation across various fields, including education, business, and community-building initiatives. Integrating digital technologies into gamification has created new possibilities for creating immersive and interactive experiences. Several technologies are crucial in developing gamified systems, each contributing to different game mechanics and user interaction.

This section briefly explores various technological solutions that support gamification, including artificial intelligence (AI), augmented reality (AR), geolocation, and blockchain.

Artificial Intelligence (AI): AI can enhance gamification by enabling adaptive learning experiences, procedural content generation, and intelligent feedback mechanisms (Bennani et al., 2022). AI-driven systems analyse user behaviour and adjust challenges dynamically to maintain engagement. Consequently, AI-driven systems allow users to have a personalised experience that can also be enhanced by chatbots, virtual assistants, or non-playable characters. These can be developed to support the players and award them points or badges after completing tasks. AI can dynamically change the difficulty and analyse the player's behaviour.

Augmented Reality (AR) and Virtual Reality (VR): AR and VR technologies (and generally Mixed Reality (MR)) (Zikas et al., 2016) can create immersive gamified environments by blending digital elements with the real world or providing entirely virtual experiences. These technologies are widely used in applications such as location-based games (e.g., Pokémon GO) and interactive training simulations. While the physical support of these solutions (especially VR headsets) may be expensive, the player is rewarded with a more immersive experience. In gamified approaches, this could benefit the players' motivation and allow them to continue playing.

Geolocation and Mobile Technologies: Many gamification initiatives leverage geolocation to encourage real-world interactions (Kotsopoulos et al., 2016). Location-based games use GPS data to guide users through challenges linked to physical locations, enhancing engagement in outdoor and cultural heritage-related applications. As everyone

nowadays has a smartphone, implementing GPS-based (or generally Location-based) games seems an ideal solution: players may be encouraged to move to complete a given task. For example, companies can implement these strategies to motivate employees to complete repetitive tasks, such as periodic machinery checks or other tedious activities.

Blockchain and Tokenisation: Blockchain technology enables secure reward systems in gamification by providing verifiable digital ownership of assets, loyalty points, or non-fungible tokens (NFTs) (Parizi & Dehghantanha, 2018). This approach is gaining popularity in educational certification and digital rewards programs. Blockchains are based on Distributed Ledger Technologies (DLT). As they are distributed, thus not centralised and prone to single point-of-failures, these technologies grant data security and transparency. This means that player scores and, eventually, financial data can be secured on an online ledger without risk of compromise. As DLT and Blockchain are also used for NFTs, these can be included in the gamified app. Participants can collect and own unique digital assets (e.g., historical artefacts) stored on a blockchain. Users thus become owners of one-of-a-kind digital items that can be traded or transferred.

5.5. Conclusion

The development of gamified applications demands a thoughtful approach to selecting tools, technologies, and methodologies to ensure technical viability and meaningful user engagement. This chapter has explored the foundational elements required to create compelling gamified solutions, beginning with a thorough technical feasibility analysis and extending to the strategic selection of platforms, architectures, and development tools.

A well-executed technical feasibility analysis is the foundation of any successful project, enabling teams to evaluate risks, allocate resources efficiently, and align the project's scope with its objectives. Understanding the user context, infrastructure requirements, and scalability early in the process lays the groundwork for a robust and adaptable solution. The choice of platform—whether desktop, mobile, web, console, or VR—must align with the project's goals and the target audience's needs, while the underlying architecture—be it

monolithic, client-server, microservices, or offline-capable—should balance performance, maintainability, and future growth.

Modern game engines such as Unity, Unreal Engine, and Godot provide powerful environments for building immersive experiences, complemented by asset creation tools like Blender and Audacity, which streamline the development of high-quality visuals and audio. The selection of these tools should consider factors such as performance, ease of use, and budget constraints to ensure a smooth development process.

Emerging technologies like AI, AR/VR, geolocation, and blockchain enrich gamified applications by enabling personalized interactions, immersive environments, and secure reward systems. These innovations open new avenues for engagement, making gamification an even more effective tool for education, training, and user motivation.

In summary, the success of a gamified application hinges on a harmonious integration of technology, user-centric design, and strategic planning. By leveraging the insights and tools discussed in this chapter, developers can craft engaging and sustainable solutions that meet their objectives and inspire and captivate their audiences.

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6. Community Involvement

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The goal of preserving and protecting heritage cannot be achieved with the single and sporadic efforts of individuals and/or organisations. Collective efforts, shared commitment, and active participation of communities are necessary. Community participation and involvement in heritage have become among the most significant topics. In 2007, the World Heritage Committee proposed a new "Fifth Cs" model by adding a new fifth "C" for "Communities" to the already existing "Four Cs" model of strategic objectives: "Credibility", "Conservation", "Capacity-Building", and "Communication". This amendment in the Budapest Declaration on World Heritage (World Heritage Committee, 2002) has given communities a new focus and recognised their potential role in all heritage works, especially all UNESCO World Heritage sites.

Thus, identifying and recognising communities as actors with a key role in heritage preservation, management, promotion, and valorisation, as well as encouraging mutual understanding, collaboration, and reactive and proactive participation, are among the challenges for successful heritage management. There is a variety of approaches that can be used to involve communities in heritage management. Whether the community involvement in heritage is intended to be achieved through volunteer programmes, education and awareness programmes, partnerships and collaborations, use of technologies, or participation of communities in the decision-making and/or design process, gamification could be used to ensure that their goals are achieved by creating an immersive, motivating, and engaging environment.

Furthermore, involving communities in designing the gamified heritage experience converts them from passive recipients of the heritage interpretations into active, empowered,

collaborative creators, partners, and contributors to the genuine representation of their culture, practices, values, and identities. Such participation nurtures a sense of pride, belonging, and ownership among the members of the communities.

6.1. Community Involvement in Heritage

As community involvement in heritage has become increasingly relevant in preserving, managing, and promoting heritage worldwide, it is important to develop a shared understanding of community involvement in heritage and its aims. This will allow, on the one hand, communication and exchange and, on the other hand, the application of this approach to safeguard the heritage and for the benefit of the local communities. Therefore, some explanations should be given to define community involvement in heritage.

A community is a network of connected, informed, empowered, and active people with something in common. Communities are classified as cultural if they hold similar cultural, ethnic, and religious backgrounds and features; geographical if they reside in the same area; and social if they share similar interests, beliefs, attitudes, and goals.

People interested in heritage belong to the so-called heritage community. They are attached to and value specific aspects of heritage which they wish, within the framework of public action, to sustain and transmit to future generations (Council of Europe, 2005), feel optimistic about it, and can and want to act as supporters. A heritage community is an entity with a collective character whose sense of identity and belonging emerges when sharing a heritage site or practice they wish to preserve, maintain, and transmit to the generations (Sousa, 2018). Part of the heritage community could be people of the geographical and cultural communities (e.g., residents, users, owners) if they positively identify themselves with the heritage and would like to act as supporters. They should be identified as multipliers to reach their communities.

Involving communities entails engaging and allowing them to participate in collaborative, cooperative, participative, and engaging activities. Some authors distinguish between participation and decision based on the contribution level to the decision-making process. According to others, participation and involvement could be defined by including

decision-making, which is when a community plays an active role in decision-making that affects it and the community's situation (Bhaskara, 2015). In both concepts, communities are empowered by decision-making. However, they do not operate at the same level, as involvement means communities are given more power in decisions, like heritage management. Community involvement refers to the processes that make interested communities get together in a project to achieve some goals after building communication bridges and consolidating the relationships between each other (Scheffler, 2017).

6.2. Areas of Community Involvement in Heritage

Community involvement in heritage is crucial. Involving and engaging the communities in heritage promotion, safeguarding, and preservation ensures that heritage is protected, appreciated, celebrated, and shared. Community involvement helps to build and foster a sense of ownership and responsibility towards heritage among the community members, ensuring that the heritage remains intact for current and future generations. It also fosters a sense of pride, belongingness and connection to the community's history and identity.

Scheffler (Scheffler, 2017) identified five main categories of community involvement in heritage: definition and inscription of heritage; development of heritage policies, actions, guidelines, and management plans; promotion and valorisation of heritage; management and safeguarding of heritage; and using heritage for community and cultural development.

Definition and inscription of heritage: Communities get involved in the inscription process of heritage to international, regional, national or local heritage lists to raise awareness about the values and significance of the heritage, to access local knowledge about the heritage, its history, current state and development, safeguarding and protection needs and, in case of site inscription to the UNESCO's World Heritage List, to take part in discussions on its outstanding universal value.

Development of heritage policies, actions, guidelines, and management plans: Communities get involved in developing heritage policies to ensure that the needs and interests of local communities have been reflected and linked to the safeguarding and preservation, management, exploitation, and utilisation of the heritage. Such community

involvement aims to ensure the proper understanding and support of heritage policies, raise awareness about the values and significance of the heritage's preservation needs, and foster their pride and engagement in safeguarding, protecting, careful, and innovative use.

Promotion and valorisation of heritage: Activities are held to help communities strengthen their emotional ties to their heritage, increase their knowledge and understanding, appreciation and awareness of the values and significance of heritage, win their support and engagement with the preservation, thoughtful and careful use of the heritage, and pass on knowledge to the following generations.

Management and safeguarding of heritage: Activities are held to engage communities in the physical conservation of heritage and its management, encourage appropriate rehabilitation and careful utilisation of heritage, increase public awareness about the safeguarding policies, regulations, and procedures and involve them in risk assessment, monitoring, and identification of opportunities and problems of the heritage.

Using heritage to foster community and cultural development: Activities are carried out to ensure the beneficial use of the heritage of local communities without compromising its integrity and vitality.

6.3. Levels of Community Involvement in Heritage

Community involvement in heritage varies depending on the degree of participants' power to influence. Inspired by Arnstein's model, Chan (Chan, 2016) proposed a ladder of participation adapted for heritage management (Figure 6.1). Although theoretical, the ladder can be used in implementing heritage initiatives with community involvement through the gamification of their efforts.

The ladder's first rung, "Education/Promotion," involves experts, municipalities, and governments raising public awareness about heritage values, with communities passively receiving knowledge. The second rung, "Protection/Conservation," sees communities recognising heritage safeguarding efforts, though participation remains passive due to one-way communication. The third rung, "Consultation," allows communities to voice opinions through hearings or meetings, marking a shift toward active involvement.

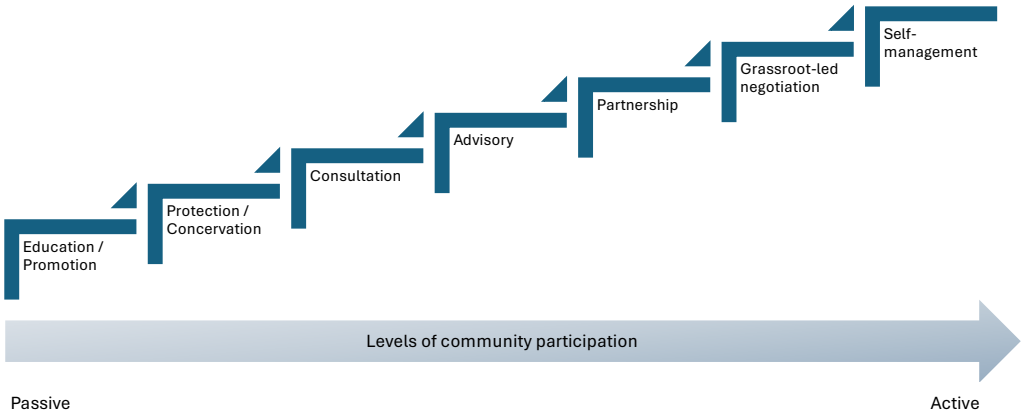

Figure 6.1.: Ladder of community participation in heritage management. (Source: Chan, 2016)

Higher rungs include "Advisory," where communities advise on preservation but risk tokenism without proper platforms, and "Partnership/Collaboration," where power is shared between communities and authorities. The sixth rung, "Grassroots-led Negotiations," grants communities significant decision-making influence, while the top rung, "Self-management," gives them veto power, ensuring control over heritage values and external interventions (Smith, 2020).

The ladder of community involvement in heritage suggests that the involvement of communities is a shift in the degree of power, as well as a change in the community's evaluation of and response to heritage. It is a movement from being aware of and knowing about heritage through caring about heritage to being motivated and able to take action and significantly contribute. This is a process of passing through three stages: cognitive (awareness/learning), affective or emotional (feeling/interest/desire), and conative or behavioural (action, e.g., sharing information, expressing opinion, initiating heritage campaigns). Thus, to become more involved in heritage issues, communities should (Camuñas-García et al., 2023):

- think more and possibly learn more about heritage, have a deeper understanding of heritage and acquire more knowledge related to heritage through various platforms and means (cognitive stage),

- feel more personally engaged, which means assigning the heritage issue higher meaning and significance, paying more attention to heritage, and developing emotions to disseminate and protect it (affective stage),
- make behavioural changes to express personal concern, such as spreading the idea of heritage preservation or visiting actual heritage sites in person (conative stage).

Although, in the first two rungs, communities are relatively passive recipients of the heritage information conveyed by the municipality, government, or experts and do not contribute to heritage-related decision-making, gamification has the potential to engage communities with heritage by creating an immersive and motivating environment, creating awareness and better understanding of the importance of preserving it. Therefore, gamification is a tool that will ensure that the campaigns' goals are achieved, heritage-related messages are conveyed to the communities and positively affect their knowledge, awareness, values, attitudes, appreciation, and care of heritage, as well as their role in heritage protection. In these rungs, gamification helps communities to activate their involvement and pass through the cognitive and affective stages by creating awareness, interest, and desire to contribute to heritage-related causes and projects. Depending on the user's motivation in gamification, various gamification elements could boost community engagement: points, badges, leaderboards, prizes and rewards, unlockable content, levels, and quests.

The following two middle rungs are associated with the greater power of communities in heritage decision-making. In these rungs, gamification could facilitate communication and engagement as a medium to ensure that communities' voices are heard and their comments on heritage projects matter. Gamification elements that could be used are feedback and rewards for the community's contributions. Gamification could be combined with social networking to facilitate multi-sectoral communication.

Gamification is also a powerful tool on the last three rungs of the ladder, although it is more crucial for the previous levels. While on the lower-level rungs, gamification is used to create attention, generate interest, and arouse a desire for action and contribution to heritage, on the up-level rungs, where the action takes place, gamification should make participation more collaborative, fruitful, and fulfilling. Collaboration and volunteering contributions

could become more engaging and productive by integrating game elements, such as points, badges, challenges, and rewards, to encourage and reward active participation. Points, achievements, progress, and levels motivate people by providing positive feedback for participating in cooperative or initiative behaviour, whereas challenging missions give them clear (e.g., cooperative) objectives.

6.4. Approach for Community Involvement in Heritage

The experience economy and stimulus–‑organism–response (S-O-R) model could explain community involvement in heritage through gamification. Combining the experience economy and S-O-R model, (Zhang et al., 2024) proposed a framework for exploring which gamification experiences influence users' behavioural intentions to care about heritage.

Pine and Gilmore (Pine II & Gilmore, 2011) define an experience economy as engaging communities and encouraging their active participation by creating unforgettable experiences. Their "Four Es" experience economy model is a widely recognised framework for understanding the value of experiences. The framework covers four experience types:

- educational experience, wherein gamification, through entertaining content and a narrative based on rigorous historical background, provides opportunities to learn about history, culture, and heritage and enhance their understanding and awareness of heritage,
- entertainment experience, wherein gamification provides fun and exciting cultural experiences,
- escapism experience, wherein avatars provided to users in gamification applications allow them to feel physically and mentally relaxed,
- esthetic experience, wherein gamification's graphics and aesthetic atmosphere provide aesthetic pleasure.

These experience types are linked to the level of participation and involvement (passive versus active participation) and the type of experience (absorption versus immersion). The theory suggests that achieving all four realms simultaneously creates superior experiences, influencing communities' behavioural intentions. Specifically, users experience entertain-

ment and esthetics during passive participation and education and escapism during active participation (Zhang et al., 2024)

Zhang et al. model and research (Zhang et al., 2024) have practical value. The authors recommend enhancing four types of experiences when designing a gamification application for heritage. They found that the most significant factor that influences user participation both directly and indirectly through perceived value is the entertainment experience. This means that, first, the entertainment experiences of gamification should be enhanced by fulfilling users' needs for an entertainment experience. Rewards such as game points, unlocked content, and levels could increase users' perceived value, thus increasing their willingness to participate.

Second, the educational and entertainment experiences should be combined to teach and entertain, increase users' perceived value, and craft a positive experience that strengthens their memories and leaves them with fond memories. Educational experience is the most significant factor affecting memory, which means that the quality educational experience could leave a deep impression on users and deepen their learning memory of heritage knowledge.

Third, the esthetical experience should also be addressed, incorporating unique local art styles and historically accurate visualisations of buildings and landscapes to ensure visual realism and enhance visual appeal. This experience can stimulate users' interest and sense of responsibility in heritage protection and promote their support of and participation in heritage protection actions in real life.

Finally, the escapist experience should be enhanced by creating immersive environments. Advanced digital technologies, e.g., VR, MR, and 3D modelling, could enhance users' escapism experience and introduce and promote heritage engagingly. This can help heritage organisations deepen users' emotional connection with heritage, increasing user participation and awareness of the need to protect heritage.

6.5. Framework for Community Involvement in Heritage

Inspired by Khan et al. (Khan, Yadav, Beena, & Kumar, 2019), a basic framework for community involvement through gamification could be proposed. The framework (Figure 6.2) can assist government, municipalities, and heritage organisations in implementing heritage initiatives with community involvement through the help of gamification of their efforts. The framework encompasses four main factors. Factors are linked to their auxiliary support pointers, which may produce significant effects if applied competently (Khan et al., 2019).

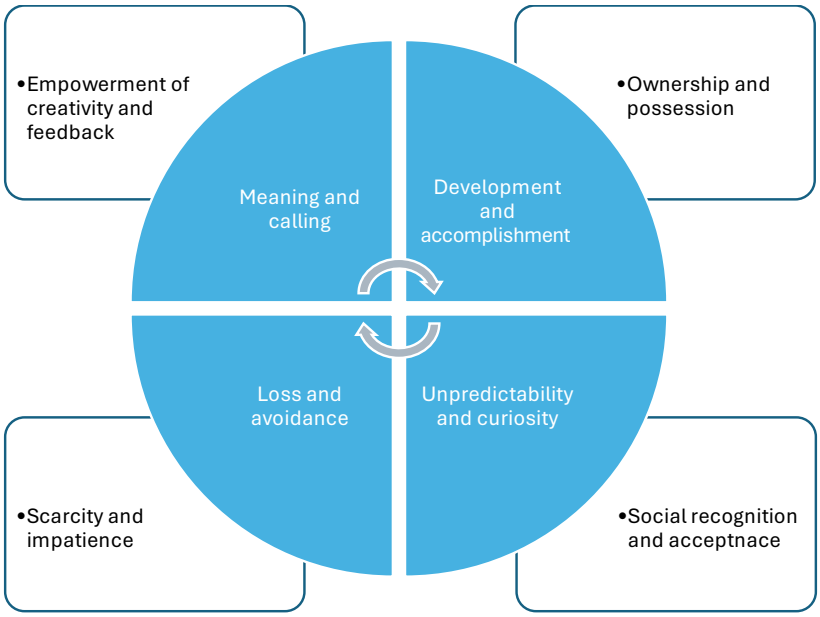

Figure 6.2.: Framework for community participation in heritage. (Source: (Khan, Yadav, Beena, & Kumar, 2019)

Meaning and calling. This factor is affected by the degree of empowerment for creativity and the feedback provided by the community. The greater the degree of empowerment, the better the clarity of the meaning that the community attaches to the heritage initiative. The feedback mechanism maintains and ensures the sustainability of the entire improvement process. Gamification is a very effective medium that is open to creativity and can focus on achievable real-world goals with a responsive feedback mechanism.

Development and accomplishment. Accomplishments are measuring benchmarks for development. Intermittent accomplishments are proof of continuous development and sustainable achievement in the long term. The community measures its accomplishments through its possessions and ownership. The heritage initiatives should have complete ownership and possession clarity. By gamifying their heritage objectives, communities can monitor their accomplishments in tangible and intangible terms, motivating them to strive for more.

Unpredictability and curiosity. One of the most concrete forms of motivation that people can experience is the element of surprise, the sense of excitement that arises when they confront the unknown, and the inner curiosity that gnaws at the inside to find everything that has not yet been revealed. People are driven to accomplish things that are typically thought to be unattainable by their desire to explore. The community is motivated to engage in activities that typically do not even grab their attention by this intense emotion, combined with social approval and acknowledgement. Gamification opens new possibilities, unites the community in a close-knit group around a shared goal, and includes measurable objectives considering the participants' accomplishments.

Loss and avoidance. The fear of loss and the caution to avoid things that could harm the community is a powerful motivator for people. They will turn out in numbers and with dedication to create a self-sustaining system of continuous improvement once they realise what could be lost in case of non-participation or non-active participation in the heritage initiatives and contribution to the development of their community. Communities are better equipped to understand how they may contribute to the development and avoid loss when achievable and realistic goals are gamified. Gamification that compels users to wait for their resources to increase and thereby understand the significance of the resources they utilise in the real world can effectively include the concepts of scarcity.

Precise targeting of the gamification initiatives and allowing communities to participate in and give feedback during the design of the gamified experience and aftermath are essential for effective community engagement and involvement. A gamified experience should consider the recommendations and profile of the community (users) it is aimed at.

Regardless of whether users are intrinsically motivated by purpose and meaning, autonomy and independence, relatedness or competence, or extrinsically motivated by rewards or change (Marczewski, 2013), gamification should be based only on a mix of game components which support the target community's motivators and thus could ensure engagement and involvement.

Community involvement in heritage management through gamification faces many challenges. One of the challenges is to design a gamification application that fits the community's needs and requirements. Successful gamification applications for heritage require interdisciplinary collaboration, including historians, educators, screenwriters, software developers, and (Marczewski, 2013) art and sound designers. Another challenge is logistics. The benefits people receive are usually intangible and hedonic. They can lose motivation if the infrastructure is inadequate (e.g., limited network connectivity, scarce internet access, remote location, inadequate infrastructure), which is common in low-density areas. Additional challenges and barriers could be technological. People can quickly lose motivation if downloading or using the gamified application requires money, specific knowledge, specific settings, advanced technological skills, or technologies the gamified system is based on that are non-compatible with the version or type of the operation system, which requires more RAM space. Lack of adequate promotion is also a barrier. Communities are usually not aware of the gamification application. There is no adequate promotional campaign to inform them about the application and its goals.

6.6. Importance of community involvement in low-density territories

Community involvement in low-density territories regarding heritage is central to maintaining and revitalising local identities while navigating contemporary challenges. As evident from previous discussions, effective community participation can yield profound benefits for preserving and adapting heritage and significantly enhance socio-economic conditions in peripheral regions. This overview delves into the various dimensions of community involvement and its critical role in connecting traditional practices to modernity.

One primary aspect of community involvement is its capacity to strengthen local identities through active engagement in heritage initiatives. Community-driven efforts can empower local populations to preserve their unique cultural expressions in low-density territories, where traditional practices and knowledge may risk fading due to globalisation and urbanisation. According to Khoroshilov, traditional societies' resilience relies heavily on community action and local governance mechanisms that adapt to contemporary demands while retaining cultural distinctiveness (Perkova et al., 2021). Such community-centred approaches play a crucial role in ensuring that heritage is not merely seen as an artefact of the past but is integrated into daily life.

The adaptability of heritage in low-density territories can also be attributed to the strong bonds formed within communities. As highlighted by Drăgan et al., active participation in heritage management fosters social cohesion, encouraging communal efforts that enhance identity and economic opportunities (Drăgan et al., 2024). By bringing together various stakeholders, including local artisans, educators, and youth, communities can create forums for sharing knowledge and cultural practices. This collaborative model preserves traditions and facilitates their evolution, allowing for a dynamic expression of culture that resonates with modern sensibilities.

Furthermore, the involvement of local communities in tourism development, particularly cultural tourism, highlights the potential for economic gains while simultaneously preserving cultural heritage. Research by Xu et al. underscores the significance of community-led tourism initiatives that focus on authentically showcasing local heritage (Xu, et al., 2023). Involving residents in tourism ensures that the narratives reflect their lived experiences, fostering pride and ownership. These efforts create jobs and draw attention to the inherent cultural richness of low-density territories, ultimately contributing to their revitalisation.

Moreover, employing modern technology as a community engagement can revolutionise how heritage is promoted and preserved. Digital initiatives, such as online platforms for sharing stories and cultural practices, allow for broader participation and representation of diverse voices within the community. Research by Hidayat et al. found that leveraging

technology helped create a sense of belonging in the context of traditional music education, facilitating interactions that enriched cultural transmission (Hidayat, et al., 2024). This blending of technology with tradition creates entry points for younger individuals to connect with their heritage in ways that resonate with contemporary lifestyles.

Another critical dimension of community involvement is the recognition of traditional practices as fundamental to local governance and social structure. The adaptive capacity of traditional systems to respond to modern legal and governance frameworks emphasises the value of integrating indigenous knowledge into contemporary policies. Mutual aid networks have been recognised as essential in maintaining social stability within communities and facilitating collective responses to challenges such as climate change (Onda, 2013). By utilising local knowledge systems and traditional decision-making processes, communities can cultivate resilience tailored to specific regional conditions.

Furthermore, the dynamic interplay between tradition and modernity requires communities to actively evaluate their cultural practices within the scope of social transformation. As Mohale et al. discuss, this intersection is not merely about retaining traditional practices but involves reinterpreting and reorganising them to highlight their relevance within modern contexts (Mohale et al., 2023) Communities that embrace this duality foster a culture of innovation that honours the past while adapting to contemporary realities, creating a vibrant social fabric that holds the potential for sustainable development.

Civic participation extends beyond local governance and economic initiatives; it encompasses cultural events, festivals, and rituals that reinforce communal identity and foster social networks. Revising traditional festivals as vehicles for cultural expression while accommodating modern audiences illustrates how communities can maintain vibrancy through tradition. In celebrating cultural occasions with contemporary adaptations, community members draw new participants and opportunities for cross-cultural exchange, enriching the local cultural landscape (Reyes-García, et al., 2016).

Lastly, community involvement in cultural heritage must be approached through a lens of inclusivity and representation. Efforts to engage marginalised voices, such as women and youth, ensure the cultural heritage narrative is diverse and reflects the

community's complexity. Initiatives aimed at amplifying the contributions of traditionally overlooked groups foster a sense of equity and shared heritage, reinforcing the importance of maintaining cultural resilience across generational divides (Zainuddin, 2023). This inclusivity supports cultural sustainability and fosters a cohesive social environment conducive to collaboration and innovation.

In conclusion, community involvement is a cornerstone of cultural preservation and adaptation in low-density territories, linking traditional heritage with modernity. These regions can harness their cultural wealth through strong communal bonds, educational initiatives, and inclusive practices, fostering economic growth and social cohesion. As communities navigate the complexities of modernisation, their active engagement in preserving and promoting their heritage will be pivotal in crafting a sustainable future that honours their unique identities.

6.7. Conclusion

Involvement of communities in heritage management is vital for the preservation, appreciation, and celebration of heritage. It empowers communities to take ownership and responsibility for their heritage, fostering a strong sense of identity and belonging. The framework for community participation, particularly through gamification, offers innovative approaches to engage communities actively in heritage initiatives. By utilising various gamification elements, communities can transition from passive recipients of information to active participants in the decision-making processes affecting their heritage.

Communities, especially in low-density territories, play a vital role in revitalising local identities and adapting heritage practices to contemporary demands. The shift from passive awareness to active participation empowers individuals, creating a dynamic environment where heritage is integrated into daily life. However, challenges in designing appropriate gamification applications and ensuring accessibility must be addressed to maximise community participation.

The implementation of gamification presents a promising approach to enhance community engagement by creating immersive experiences that motivate communities to

connect with their heritage actively. By integrating elements of education, entertainment, and aesthetic pleasure, gamification can effectively bridge the gap between passive reception of information and active participation in heritage initiatives.

Embracing community involvement through effective communication, education, and engagement strategies is essential for ensuring the sustainability and integrity of heritage for future generations. This not only enriches the community's connection to its past but also contributes to the social fabric and cultural continuity in an increasingly interconnected world.

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7. Educational Engagement

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Games and gamification and their integration into the educational environment are becoming increasingly important, especially in heritage conservation. Understanding these concepts is essential for their effective integration into teaching and instructional strategies, both in the context of school education and within the framework of education and awareness of cultural heritage. As a structured activity usually played for fun, games are sometimes used in education (Surendeleg, G. et al. 2014). Games often involve rules, objectives, tasks, and interactions that engage players/students/visitors in a competitive or cooperative environment. They can take various formats, from board to video games (Surendeleg et al., 2014; Szeto et al., 2021). Gamification involves integrating elements into learning activities, such as points, badges, levels, and progress rewards, that create a sense of achievement (Rodrigues et al., 2019; Alabbasi, 2017; Toda et al., 2023) to influence behaviour and improve experiences.

This approach (according to Karvánková et al., 2024) uses the natural appeal of games to motivate students/visitors and encourage participation in learning or cognitive activities. Studies show prospective teachers often view gamification elements as positive and motivating for students. Many prospective teachers see gamification as an opportunity to increase student engagement and interest in the subject (Kapp, 2012). Some see it as a tool to increase student motivation and engagement, while others are concerned about focusing too much on games and rewards (Deterding et al., 2011) to the detriment of the stated learning objective. Research shows that adequately implemented gamification can lead to more effective learning outcomes and increased student motivation. Additionally, gamification fosters a desire to explore cultural heritage sites, particularly important in low-density territories.

7.1. Benefits and Drawbacks of Gamification in Education

Gamification significantly impacts learning and can bring benefits that improve the learning process or get to know places. First, it increases student motivation by using the principles of rewards and competitions. Rewarding students for achieved goals or achievements helps them feel valued and motivates them to continue learning, or visitors become more involved in learning about heritage sites. Another benefit of gamification is increasing student engagement. Game elements such as challenges and levels make learning fun and interactive, leading to deeper understanding and better mastery of the subject matter. Gamification also allows for immediate feedback, making it possible for students to learn from mistakes and develop strategies for improvement quickly. Another important aspect is the promotion of autonomy and self-control. This approach gives students more control over their learning by offering them a choice of tasks, difficulty levels, and paths to achieve their learning goals. This feeling of autonomy promotes self-control and personal responsibility for learning. Gamification improves information retention. Interactive and fun elements can help students remember and retain information better.

Additionally, gamification serves not only students but also visitors in exploring cultural heritage. It fosters a desire to explore cultural heritage sites, making learning more engaging and interactive for students and visitors. This is particularly important in low-density territories, where gamification can enhance the experience of discovering and appreciating cultural heritage.

Emotional experiences during interactive learning and learning in situ and over time through gamification have also received considerable attention in educational psychology. Games combine fun with educational contexts and often evoke various emotional responses influencing student engagement and outcomes. Studies have shown that games elicit excitement, curiosity, frustration, and joy, increasing motivation to learn and engage (Alotaibi, 2024; Lei et al., 2022; Siuko et al., 2023). Fuster-Guilló et al. argue that the improvement in academic performance from game-based learning stems largely from emotional engagement (Fuster-Guilló et al., 2019). This emotional connection helps students connect with the learning material (just as visitors connect with a place), leading to better

retention and understanding of concepts. Ke et al. emphasise the role of narrative games that use "plot hooks" and emotional intimacy to make players emotionally invested in characters and storylines, thereby promoting deeper cognitive engagement (Ke et al., 2015). Despite the obvious emotional benefits of gamification, there are also disadvantages. Emotional experiences can lead to adverse consequences such as anxiety and frustration, especially when players struggle or when the game design does not support their emotional needs (Bigdeli & Kaufman, 2017). Chen et al. emphasise the importance of studying these emotional responses to optimise the design of educational/cognitive games and ensure that games remain practical learning tools rather than sources of stress (Chen et al., 2024).

In heritage gamification, the importance of spatial context, especially the local dimension, is often emphasised. In this regard, the connection between escape games and the concept of Place-based learning (PBL) is crucial for promoting a deeper connection between visitors or students and their surroundings. The connection between place-based learning and gamification in the context of heritage conservation in low-density territories is significant, as both approaches emphasise experiential learning, contextual engagement, and collaborative problem-solving. Place-based learning is an educational strategy that uses the local environment and community as a basis for teaching or learning, allowing students to connect academic concepts with their immediate surroundings (Akbaş & Çakmak, 2019). This method improves students' and visitors' understanding of geographical concepts by immersing them in a real-world context, promoting a sense of belonging and responsibility towards the local environment (Hebert & Lewandowski, 2017). Gamification strategies in heritage often incorporate local geography, history, and cultural elements, making immersive learning and exploration relevant and engaging (Miloiu et al., 2024). By placing participants in scenarios that require them to navigate and interact with the environment, escape games are closely aligned with the principles of local education.

Education is pivotal in preserving and promoting heritage, particularly in low-density European areas. It cultivates literacy and skills and serves as a vehicle for cultural continuity and identity formation. Researchers have highlighted the intersection between education and cultural heritage preservation, illustrating that educational initiatives can

foster community pride and engagement with local traditions, especially in rural or marginalised regions (Bennett, 2020). For instance, the "Cultural Heritage in Education" project in Italy integrates local history and traditions into educational materials used in the classroom (Martini & Moretti, 2021). In countries such as Spain and Portugal, local festivals and traditional arts are used as teaching resources (Gonzalez, 2022). Research shows that such initiatives raise awareness of local culture among students and actively engage them in its preservation (Santos, 2023). Duan and Choatchamrat outline the impact of educational initiatives on cultural heritage in Guizhou Province, suggesting that educational efforts can enhance local pride and responsibility among youth, which is vital for cultural preservation (Duan & Choatchamrat, 2023). Similarly, studies by Wang and Woramitmaitree indicate that practices such as traditional work songs serve as educational tools to foster cultural identity while facilitating the preservation of intangible heritage (Wang & Woramitmaitree, 2024). Furthermore, Meng and Chuangprakhon emphasise the importance of education in safeguarding local folk songs and aligning educational frameworks as necessary for protecting cultural traditions (Meng & Chuangprakhon, 2024). This aligns with cultural preservation goals, where education teaches literacy and skills and instils a sense of belonging and heritage awareness among students.

The relationship between education and heritage is highly relevant in European low-density areas. Communities in these regions often possess rich cultural histories that are at risk of fading due to modernisation and demographic changes. Educational programs can critically revitalise traditions through curricula emphasising local history and cultural practices. For instance, initiatives that integrate local cultural elements into classroom instruction can raise awareness and appreciation among students, as evidenced by the research by Gao and Karin on the role of educational institutions in cultural preservation (Gao & Karin, 2024).

Moreover, engaging young people in heritage activities, such as performances and competitions, fosters deeper community involvement and personal connections to their heritage. This educational approach resonates across various cultures globally, as shown by studies on folk music and its educational implications (Menkshi et al., 2021;

Zhou & Chuangprakhon, 2023). These approaches broaden students' worldviews and encourage a holistic understanding of the importance of preserving cultural identity through education.

7.2. Gamified Educational and Cultural Heritage Programmes

In terms of the most effective use of gamification techniques to promote cultural heritage at the local level in areas with low population density, it is important, in addition to understanding the different types of players and their characteristics, especially how they fit into a "given" game. That is, capturing the primary interest of each type of player. Two types of primary interest can be defined as "content" and "control". Players primarily interested in content tend to focus on the style and theme of the game itself, regardless of the actions they can perform. On the other hand, control users are more interested in what they can do in the game, and the style and content are of secondary importance. The authors of this guide consider it essential to capture the game's content, for example, as an educational goal (see Table 7.1 for more details), especially when creating gamification procedures aimed at promoting cultural heritage.

As stated, for example, Komínková (2023), there are many websites and applications, such as Blooket, Gimkit, Socrative, Quizlet, Kahoot! or Toglic, which allow teachers to use pre-prepared quizzes and mini-games from other authors or create their own. They can also use applications such as Duolingo, Ribbon Hero and the Khan School website, which use various gamification elements such as points and badges. Some applications, such as Classcraft or Class-Dojo, can partially transfer the educational process into a game, thus motivating students to complete tasks. Students can then share their results and evaluate each other. These applications try to support cooperation between students and communication with the teacher.

Nevertheless, gamification is becoming an increasingly popular tool for protecting and understanding cultural heritage. For example, in Czechia, a new concept of "rules" is emerging in this context, related to revitalising abandoned villages in the Sudetenland through gamification. It uses geospatial data and various gamification techniques to engage

local communities and support regional development (Karvánková et al., Rypl, 2024). Another important project is "NAKI III" (FAMU, 2025), a research initiative supported by the Ministry of Culture of the Czech Republic, which aims to develop methods and technological tools to protect digital games as part of the national cultural heritage. The global mobile application "InHeritage" (Srdanović et al., 2025) uses VR and AR technologies to protect and promote cultural heritage. The application offers attractive, interactive and immersive experiences, especially for younger generations. As Miloiu and Musteață (2024) state, the "Questo Game" project uses gamification to promote cultural heritage by incorporating various games that help users better understand and interpret cultural monuments in Romania.

Table 7.1.: Examples of educational methods and approaches supporting the concept of gamification

Interactive and immersive learning experiences	
Creating educational games	Developing games that combine fun with learning so that players gain new knowledge through interactive experiences.
Simulation of historical events	Using gamified simulations brings historical events closer to reality and allows players to experience them firsthand.
Virtual tours	Creating gamified virtual tours of historical sites where players can explore and learn about their significance by introducing tasks and challenges, rather than offering simple tours where visitors explore the space at their own pace and passively accumulate information along the way.
Educational modalities and collaborative learning environments	
Different forms of learning	Integration of different educational modalities such as texts, videos, audio recordings and interactive elements through a gamification contex.
Collaborative tasks	Creating tasks that require collaboration between players to encourage collaborative learning and knowledge sharing.
Online courses	Offering online courses and workshops will allow players to deepen their knowledge of cultural heritage.
Evaluation and feedback mechanisms	
Quizzes and tests	Implementing quizzes and tests that allow players to test their knowledge and get instant feedback.
Performance evaluation	Introducing mechanisms to evaluate player performance based on their achievements in the game.
Feedback from players	Collecting feedback from players through gamified questionnaires and surveys to further improve the gaming experience.

Source: Authors, 2025

7.3. Conclusion

In conclusion, integrating games and gamification into educational environments is increasingly important, especially in protecting heritage. Understanding these concepts is key to effectively incorporating them into teaching strategies within school education and in the broader context of cultural heritage awareness. Research shows that, when properly implemented, gamification can lead to more effective learning outcomes and higher student motivation. It also supports the desire to explore cultural heritage sites, particularly important in low-density territories. Gamification benefits learning by increasing motivation, engagement and retention of information, promoting autonomy and self-control, and providing immediate feedback. Emotional experiences during gamified learning further enhance engagement and understanding, although they can also lead to anxiety and frustration if poorly designed.

Education is key in protecting and promoting cultural heritage, especially in low-density European areas. They cultivate literacy and skills as a means of cultural continuity and identity formation. Educational initiatives can foster community pride and engagement with local traditions, especially in rural or marginalised regions. For example, projects such as "Cultural Heritage in Education" in Italy and local festivals and traditional arts in Spain and Portugal have successfully integrated local history and traditions into educational materials, raised awareness and actively engaged students in cultural preservation.

The interplay between education and cultural heritage is essential for maintaining community identities, especially in areas with low population density. Educational institutions must recognise their role as cultural stewards and integrate local heritage into their programs to ensure that future generations appreciate and preserve their unique cultural legacy. The intersection of place-based learning and heritage-focused gamification offers a robust framework for enhancing the learning experience. For example, educators can foster a deeper understanding of geographical, historical, and other concepts by contextualising learning and engaging gamification mechanics while fostering collaboration and critical thinking among students. This synergy enriches the learning experience and fosters a sense of responsibility for the place and the environment.

Integrating gamification and education into heritage preservation enriches the learning process. It fosters a sense of belonging and heritage awareness among students/visitors/community members, making it a powerful tool for cultural continuity and community engagement.

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8. Sustainability and Social Impact

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Gamification has emerged as a powerful strategy to promote sustainability in low-density areas, where traditional engagement methods often fall short due to geographic dispersion, limited infrastructure, and resource constraints. When thoughtfully designed, gamified systems can transform sustainability from an abstract concept into tangible, actionable behaviours while addressing the unique challenges of sparsely populated regions. When strategically designed for low-density regions, gamification can serve as a transformative force for sustainability—bridging gaps in infrastructure, engagement, and long-term ecological stewardship. Unlike urban environments, where digital saturation and high population density facilitate the rapid adoption of gamified systems, rural and sparsely populated areas present unique challenges: intermittent connectivity, limited technical literacy, dispersed communities, and fragile ecosystems that require careful intervention. This chapter examines three critical dimensions that ensure gamification drives immediate engagement and contributes to long-term sustainable development: Environmental Alignment, Technological Resilience, and Economic Viability. Each dimension is explored through theoretical frameworks, case studies, and practical implementation strategies tailored to low-density contexts.

8.1. Environmental Alignment

The fundamental challenge of environmental alignment in gamification lies in creating authentic connections between game mechanics and tangible ecological outcomes. Research demonstrates that superficial implementations focusing solely on digital rewards without real-world verification often fail to sustain engagement or produce measurable impact (Karvánková et al., 2024). Effective systems employ biophysical feedback loops correlating player actions with environmental monitoring data. For instance, the FjordGuard initiative

in Norway successfully integrated satellite imagery and IoT sensors to demonstrate how in-game clean-up missions corresponded with measurable reductions in shoreline pollution (Baer et al., 2022). Such approaches leverage place-based design principles that tie game mechanics to specific local conditions and challenges, moving beyond generic sustainability prompts to create meaningful behavioural change. Longitudinal studies of programs like Japan's Forest Lifeline reveal how staged engagement strategies - progressing from basic education to mentorship roles - can effectively transition users from short-term participation to long-term environmental stewardship (Wang et al., 2023). These findings underscore the importance of designing gamification systems that evolve with user engagement levels while maintaining clear, verifiable connections to physical ecosystems.

8.1.1. Behavioural Psychology Foundations

The integration of behavioural psychology into gamification strategies for environmental sustainability reveals a set of key mechanisms that govern pro-environmental behaviour. At the core is the principle of immediate feedback, which enables users to visualize the environmental consequences of their actions in real time. For instance, when applications display instantaneous data – such as CO_2 savings resulting from choosing a bicycle over a car – they activate reward circuits in the brain, thereby reinforcing environmentally responsible behaviour through direct and observable outcomes (Kamar et al., 2023). Another essential mechanism is the progressive structuring of goals. By creating tiered achievement systems - for example, advancing from "Novice Recycler" to "Eco Champion" - designers can accommodate varying levels of motivation and commitment. This approach supports both initial user engagement and sustained participation across diverse demographic groups (Negruș a et al., 2015).

Social comparison, a third and equally powerful mechanism, enhances motivation by embedding individual choices within a broader community framework. Leaderboards that show comparative metrics - such as energy savings by neighborhood - introduce elements of friendly competition, which have been shown to significantly increase participation. In rural environments, this method has led to behavioral shifts of up to 60%, highlighting its potential for fostering collective engagement (Wang et al., 2023).

Taken together, these mechanisms demonstrate that effective environmental gamification is not merely a matter of design, but of aligning interface functionality with empirically grounded psychological principles. By leveraging cognitive triggers – immediate feedback, structured progression, and social benchmarking - gamified systems can transform abstract sustainability goals into personally meaningful actions. The outcome is not only increased engagement but a measurable shift in long-term behavioural patterns. In this context, behavioural psychology does not serve as an accessory, but as a foundational logic for building interventions capable of shaping environmental responsibility in a consistent, scalable, and scientifically informed manner.

8.1.2. Implementation Models

Implementation models for environmental gamification in low-density or rural areas typically fall into three main formats, each adapted to local capacities and environmental contexts. One effective approach is the use of resource *guardianship games*, such as the *Peatland Protectors* augmented reality game in the Scottish Highlands. This initiative combined educational content on bog conservation with participatory data collection, encouraging players to submit GPS-tagged photographs of erosion sites. These user-generated contributions enabled conservationists to better identify and prioritize areas in need of restoration. A second format involves *circular economy simulators*, exemplified by Portugal's *Alentejo Eco-Challenge*, which used a seasonal board game structure to promote sustainable agricultural strategies. Participants were challenged to balance water consumption, crop rotation, and rural tourism income, with the most effective strategies later adopted by local farming cooperatives. In regions facing connectivity constraints, *low-tech solutions* have proven highly effective. In Patagonia, the *Eco-Ranger program* utilized a stamp-based paper booklet system to track conservation tasks. Participants could exchange completed booklets for goods or services at partnering local businesses, creating a tangible link between environmental action and community rewards. Crucially, all such models require careful ecological impact assessments. In Iceland's Þingvellir National Park, a geocaching initiative had to be redesigned after initial waypoints led visitors onto fragile moss-covered areas. Following expert input, the program was adapted to use virtual

check-ins along existing durable trails, ensuring continued engagement while protecting the ecosystem.

These diverse examples highlight the adaptability and ingenuity required to implement environmental gamification in rural or low-density contexts. While the tools and formats vary. from augmented reality to paper-based systems, the underlying principles remain consistent: fostering local engagement, aligning game mechanics with ecological realities, and ensuring that participation yields tangible benefits for both users and ecosystems. Successful models are those that embed gameplay into everyday practices and socio-economic structures, transforming conservation from a passive concern into an accessible, rewarding activity. Moreover, the examples illustrate that simplicity and contextual sensitivity often outweigh technological sophistication. Whether through data collection, behavioural nudges, or educational simulations, effective gamification builds community capacity for long-term stewardship.

8.2. Technological Resilience

The sustainability of gamification systems hinges on their ability to function reliably despite the technological constraints typical in low-density territories—intermittent connectivity, limited device access, and scarce technical support. The technological implementation of gamification in low-density territories must account for significant infrastructure limitations. Research by the International Telecommunication Union (2023) indicates that approximately 42% of rural regions experience daily connectivity disruptions, necessitating offline-capable design solutions. Hierarchical system architectures have proven effective, combining fully offline core functionality with optional synchronization capabilities. The Island Survival program in the Faroe Islands exemplifies this approach by using procedurally generated quests stored locally on devices, with weekly synchronization opportunities when players access ferry Wi-Fi networks. Alternative interface solutions such as SMS-based systems (e.g., AgriQuest Kenya) and QR-code-enabled paper components (e.g., Mongolia's Steppe Heroes) demonstrate how low-bandwidth alternatives can maintain engagement across diverse technological landscapes (Gomes, 2024). Hardware durability represents another critical

consideration, with innovations like kinetic chargers in Scotland's Peatland Scouts and fire-resistant modular components in California's Redwood Resilience program addressing the physical challenges of deployment in remote areas. A 36-month study of 14 rural gamification initiatives found that systems incorporating these resilience principles demonstrated 3.5 times longer operational lifespans than conventional online-dependent models (Daniskova & Novakova, 2024).

Implementation models in rural or low-density settings reveal that the effectiveness of environmental gamification hinges on adaptability, local relevance, and integration with real-world ecological processes. Whether employing high-tech tools like AR and GPS or low-tech solutions such as stamp-based booklets, successful initiatives share a focus on simplicity, inclusivity, and direct community benefit. Crucially, they bridge gameplay with tangible outcomes - be it conservation data, sustainable practices, or community rewards - thus reinforcing the purpose behind participation. These models also highlight the necessity of continuous ecological evaluation and iterative design, as even well-intentioned systems can cause unintended harm without careful oversight. Ultimately, gamification in these contexts thrives when it aligns technological means with environmental goals and local capacities.

Ensuring the long-term viability of environmental gamification systems requires thoughtful planning for maintenance, adaptability, and resilience across their entire lifecycle. A key strategy involves modular content management, as illustrated by the *Village Voices* platform, developed with UNESCO support. This system empowers local administrators - often with limited technical expertise - to independently update narrative content and imagery through an intuitive content management interface. By reducing dependence on external developers, the platform supports long-term community ownership and relevance. In parallel, hardware design plays a crucial role in system durability. In Greece's Peloponnese region, solar-powered information kiosks equipped with e-ink displays have been deployed in remote locations. These displays consume very little energy and remain operational under harsh environmental conditions, illustrating how low-maintenance technology can support sustained engagement. Resilience in the face of environmental disruptions

is also critical. During a flood event in Serbia, the *Danube Watch* system demonstrated the importance of graceful degradation. When central servers were temporarily lost, the system automatically transitioned to storing data locally on volunteers' devices, ensuring continuity until connectivity was restored. Looking ahead, emerging technologies such as edge computing and blockchain offer promising pathways for decentralized data storage and reduced infrastructural vulnerability. The *Baltic Trail* project in Lithuania is at the forefront of this innovation, utilizing community-operated nodes to host game data, thereby decreasing reliance on distant centralised servers, and improving accessibility in rural zones.

These examples highlight that sustainable gamification systems must be designed not only for user engagement, but also for technical flexibility, environmental resilience, and evolving digital infrastructures. Systems thrive when they allow local stakeholders to manage and adapt content autonomously, ensuring ongoing relevance without heavy reliance on external technical support. At the same time, hardware and software must be robust enough to endure environmental stresses and infrastructural limitations, particularly in remote or vulnerable areas. Innovations such as solar power, modular content platforms, and decentralized data storage reinforce the importance of designing for resilience, not just performance. Ultimately, the durability of gamified systems depends on a comprehensive approach that anticipates both ecological and technological shifts while keeping community needs at the core.

8.3. Economic Viability

For gamification to endure beyond initial funding cycles, it must establish sustainable revenue streams while remaining accessible to local populations. The long-term success of gamification initiatives in low-density territories depends fundamentally on establishing economically sustainable operational models. Research indicates that approximately 68% of projects fail to transition successfully from initial grant funding to ongoing financial viability, a phenomenon termed the "maintenance cliff" (Musango & Brent, 2011). Successful programs employ diversified revenue strategies that combine microtransactions, data monetization,

and skills-based exchanges. Bhutan Heritage Trails demonstrates the potential of purpose-driven microtransactions through its virtual prayer flag system, which generates ongoing funding for physical trail maintenance. Ethical data monetization models, such as those implemented by Lapland Snowkeepers, show how anonymized player data can create substantial revenue streams while contributing to climate research (Wu et al., 2023). Perhaps most innovatively, Portugal's Cork Forest Champions program integrates gameplay with real-world vocational training, providing players with industry-recognized certifications that enhance local employment opportunities. The tiered funding approach employed by Estonia's Saaremaa Secrets project offers a replicable model for gradual financial transition, progressing from complete grant dependence in Year 1 to 70% user-supported revenue by Year 3 through strategic premium feature development and platform licensing (Negruța et al., 2015). These cases collectively illustrate how thoughtful economic design can overcome the sustainability challenges that plague many rural gamification initiatives.

8.3.1. Funding Models in Practice

Sustainable funding remains a cornerstone of successful environmental gamification initiatives, with diverse models emerging to balance financial viability and accessibility. In Slovenia's Karst region, the *Limestone Legends* game exemplifies a public-private ecosystem approach. The project is co-funded through a tripartite model: local municipalities contribute 30% of the budget under cultural preservation initiatives, local wineries provide 50% in exchange for premium content integration showcasing their vineyards, and the remaining 20% comes from user purchases of optional game expansions. This diversified structure ensures financial stability while keeping the core content freely accessible to the public. An alternative model focusing on skill-based monetization can be seen in the *Alaskan Survival Challenge*, where top-performing players are offered internships within national parks. This not only incentivizes engagement but also serves workforce development goals, offsetting recruitment and staffing costs through gameplay performance. In Finland, the *Lakeland Watchers* platform adopts a data-as-currency model. Participants may choose to share anonymized gameplay data with academic and governmental researchers, generating income streams that support ongoing server maintenance and platform development. .

To further reduce costs, several systems adopt collaborative development strategies. The European Union's *Rural Gamification Toolkit* has been adapted by 17 regional projects, with shared templates leading to development cost reductions of up to 85%. Volunteer networks also play a critical role. Wales' *Celtic Keepers* program leverages the expertise of retired IT professionals, training them as moderators and technical support staff, resulting in annual savings of approximately £120,000. Infrastructure synergies provide another layer of efficiency. Montana's *Big Sky Explorer* avoids duplicating monitoring efforts by integrating data directly from existing wildlife sensors, thereby streamlining both hardware and maintenance investments.

Evaluating the impact of these funding strategies requires rigorous metrics. The *Sustainability ROI Matrix*, developed by Musango and Brent (2011), offers a four-quadrant framework assessing Environmental Benefit, User Retention, Revenue Generation, and Community Capacity Building. When applied across twelve gamified sustainability projects, the matrix revealed that systems achieving balance across all four dimensions enjoyed operational lifespans three times longer than those with uneven focus. This underscores the importance of holistic planning, where financial design is interwoven with user engagement, community value, and ecological outcomes.

Creating sustainable gamification systems for low-density territories requires meticulous attention to environmental integration, technological appropriateness, and financial realism. The most successful implementations—like Scotland's peatland conservation game or Portugal's farming simulator—succeed by aligning digital engagement with tangible local benefits while designing for long-term operational realities. The evolution of gamification in low-density territories points toward an emerging paradigm of regenerative design that moves beyond harm reduction to restore and strengthen local ecosystems actively. Pilot programs testing AI-driven personalization and decentralized autonomous organization (DAO) structures suggest promising directions for future development (Wang et al., 2023). As research continues to explore the behavioural carryover effects from virtual to physical environmental actions, the potential grows for gamification to serve as a legitimate governance tool for sustainable regional development. The cases and principles discussed in

this chapter provide a robust foundation for designing systems that achieve lasting impact while respecting low-density territories' unique constraints and opportunities. Future innovation should enhance interoperability between systems, strengthen the evidentiary base for long-term behavioural change, and develop standardized metrics for assessing comprehensive sustainability impact across environmental, technological, and economic dimensions.

Looking ahead, the evolution of environmental gamification will be shaped by emerging technologies and sustainable design philosophies. One promising frontier lies in the integration of adaptive artificial intelligence capable of personalizing challenges in real time. By analyzing individual user behaviour alongside environmental variables, these systems can tailor experiences that maintain motivation while responding dynamically to ecological shifts. This not only enhances engagement but also ensures that gameplay remains contextually relevant and impactful.

Equally important is the development of interoperable standards that facilitate collaboration between disparate platforms. When systems can seamlessly share data and resources, whether across different geographic regions or institutional frameworks, they create opportunities for scaling impact and avoiding redundancy. Such interoperability strengthens the ecosystem of gamification by fostering knowledge exchange, coordinated monitoring efforts, and unified environmental responses.

Sustainability in design will also play a central role in shaping future initiatives. Circular design principles are gaining traction, promoting hardware and software components that can be repurposed, repaired, or recycled at the end of their lifecycle. This approach not only minimizes environmental waste but also reduces long-term costs and dependency on scarce resources. By embedding sustainability at both the experiential and infrastructural levels, the next generation of gamified systems can become more resilient, ethical, and aligned with broader ecological goals.

As demonstrated by the growing body of case studies, gamification becomes more than a tool when these principles are applied thoughtfully—it evolves into a self-sustaining

ecosystem that perpetuates both environmental stewardship and community resilience in low-density regions.

8.4. Social Impact

Sustainability and social impact are increasingly interwoven with discussions surrounding heritage, gamification, and low-density territories. Integrating these themes is crucial for crafting a sustainable future, especially in rural and semi-urban settings, where maintaining cultural heritage and promoting social cohesion can significantly enhance the quality of life.

In today's digital society, gamification can ensure greater accessibility and understanding of cultural heritage (Anderson et al., 2010). Awareness, curiosity, education, involvement, and the individual's emotional experience are key factors in preserving cultural heritage, dissemination, and sustainability (Kalak et al., 2023). Games are part of the development of societies in historical terms. They are a means of social communication, personal experience, and engagement. Leaving a lasting mark on human consciousness, they indirectly encourage the individual to take further action. This can be associated with a more responsible attitude towards history, direct involvement in causes related to cultural and historical heritage, and dissemination of information. All this contributes to sustainable heritage management horizontally and supports implementing public policies based on the "bottom-up" approach.

Gamification transforms how people interact with cultural heritage by making history and traditions more engaging, accessible, and interactive. What is unique about digital games is that they provide connectivity between the virtual and physical worlds, engage participants, and deploy new means of interacting with heritage. Through game mechanics based on human desires, such as competition, self-expression, success, rewards (points, badges, status), and challenges, communities are motivated to learn, preserve, and promote their cultural heritage (Lounis et al., 2014). In addition, widespread forms of engagement such as treasure hunts, discovery of values, storytelling, and real-life participation in reenactments of events in the context of the location also enhance engagement. In

practice, achieving sustainability is associated with increased participation and engagement, which is increasingly achieved through gamification (Brigham, 2015). It improves the user experience, increases user motivation, engagement, and enjoyment, increases interest, and positively impacts various aspects (Seaborn & Fels, 2015). The ability for users to interact with historical and cultural artefacts and sites, explore ancient monuments, and engage with cultural practices in previously impossible ways is mainly at the heart of the application of gamification as a tool for achieving sustainable social impact (Remondino et al., 2011). It increases understanding of cultural heritage and the importance of cultural values. It raises awareness of the need for active participation of the individual to ensure its preservation for future generations (Yulong & Hunter, 2015).

In exploring the connection between sustainability and heritage in low-density territories, it is essential to recognise the dual role of cultural heritage as both a resource and a tool for community empowerment. Heritage management must prioritise long-term planning and community engagement as critical components for fostering sustainable development. This is echoed in the work of Tsintskiladze, who underscores the necessity of integrating cultural heritage into sustainable frameworks to ensure social empowerment and environmental stewardship (Tsintskiladze, 2024). Furthermore, preserving traditional village morphologies can aid in poverty reduction while balancing economic growth and ecological sustainability in low-density regions, as indicated by Wang et al. (Wang et al., 2024).

Low-density urban planning is particularly relevant as it offers an opportunity to reflect on social sustainability. Studies have shown that low-density neighbourhoods can enhance social outcomes related to community attachment, safety, and environmental quality, while higher densities often yield more significant access to services. Awad's analysis indicates that social outcomes relating to attachment and safety are generally more positive at lower densities (Awad, 2022). This dichotomy prompts a reevaluation of our urban planning strategies, suggesting that a hybrid approach may be needed—utilising the strengths of both low-density environments and the socio-economic benefits of more compact urban forms. Fatone et al. discussed the complex relationship between compactness

and sustainability, indicating that low-density areas can achieve high environmental and urban quality (Fatone et al., 2012).

Moreover, the role of gamification in promoting sustainable practices is garnering interest. By gamifying sustainability efforts, communities in low-density territories can engage residents in activities emphasizing environmental stewardship while celebrating local heritage. This approach not only raises awareness but also fosters a sense of community ownership and pride, which is crucial for the longevity of sustainable initiatives, as supported by insights from Stanikzai et al. on the benefits of integrating cultural heritage into sustainable practices (Stanikzai et al., 2024). By leveraging heritage as a focal point for gamification, these areas can stimulate economic and social revitalisation, ensuring that sustainable practices are interwoven with the community's cultural narrative.

The contribution of gamification to the concept of sustainable development and the Millennium Development Goals (United Nations, 2025) is significant, mainly if it is reflected in initiatives that have both engaging and educational effects, which in the long term aim to ensure the formation of an individual and public culture related to a responsible attitude towards cultural heritage. It helps bridge the gap between abstract knowledge and tangible cognitive perception of knowledge through experience, making cultural heritage more accessible and relevant to modern audiences (Geraci & Recine, 2014). It transforms the process of accessing cultural heritage from passive information and observation to active participation in historical scenarios, promoting a more profound and lasting connection with cultural heritage (Remondino & Rizzi, 2010).

Lastly, addressing the disparities between high and low-density areas is imperative in pursuing sustainable development. The Sustainable Development Goals (SDGs), particularly Goal 11—Sustainable Cities and Communities — emphasise the necessity for inclusive planning that considers the unique attributes of low-density territories, promoting equal access to resources and opportunities (Abastante et al., 2021). As urban planners explore avenues for revitalising low-density territories, it is crucial to employ comprehensive spatial models that inform the decisions regarding sustainable urban development, as highlighted by Gomes (Gomes, 2020).

Gamification is crucial for raising awareness about preserving our shared heritage (Idris et al., 2016). A sense of heritage stewardship is instilled through various virtual reconstructions of historical landmarks or simulations of conservation, preservation, etc. This is especially important in today's dynamic society, where many artefacts, historical sites, and traditions face threats from oblivion, urbanisation, climate change, political interpretations, changing societal values, etc. (Orlandi & Marsili, 2019).

As a bearer of cultural and historical memories, the place and its authenticity are important for the game to involve the user in engaging with the cultural heritage in its original context (Mortara et al., 2014). This achieves the preservation of historical events and facts over time, as well as knowledge, participation, and higher engagement.

The balance between the entertainment value and the informational and educational content of the game is important for sustainability. This is a significant challenge. Efforts should be focused on developing more engaging games that educate and captivate users (Yanti et al., 2023).

The interplay between sustainability, heritage, and social dynamics in low-density territories presents challenges and opportunities. By fostering community engagement, leveraging gamification, and integrating cultural heritage into urban planning strategies, it is possible to achieve meaningful social impact while promoting sustainable development in these regions.

8.5. Conclusion

Gamification has emerged as a powerful tool for fostering sustainability and social impact in cultural heritage, particularly in low-density territories where traditional engagement methods often fall short. By leveraging interactive and immersive experiences, gamification enhances accessibility, education, and community participation, ensuring that heritage is preserved and actively integrated into contemporary society.

One of the key contributions of gamification is its ability to bridge generational and geographical gaps, making heritage more relevant to younger audiences and remote communities. Through storytelling, augmented reality, and participatory challenges, it

transforms passive observation into active involvement, fostering a sense of ownership and responsibility toward cultural preservation. This aligns with the "bottom-up" approach, empowering local communities to drive heritage initiatives rather than relying solely on institutional efforts.

Moreover, gamification supports sustainable tourism and economic development in low-density regions by creating engaging visitor experiences that extend stays and promote local traditions. Platforms like Actionbound and Trove demonstrate how digital tools can mobilise collective action, from documenting historical artefacts to revitalising forgotten narratives.

The social impact of gamification lies in its capacity to strengthen cultural identity, promote lifelong learning, and encourage stewardship of heritage. Balancing entertainment with education ensures that heritage remains a living, dynamic force—contributing to social cohesion, economic resilience, and the long-term sustainability of cultural memory for future generations. Thus, gamification is a technological trend and a catalyst for meaningful, sustainable engagement with heritage, ensuring its survival in an ever-changing world.

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9. Cultural Sensitivity and Inclusivity

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Cultural heritage, tangible or intangible, represents a foundational aspect of human identity and history, offering deep insights into the diverse cultural expressions that shape societies. With further move into the digital age, it is increasingly essential to explore innovative methods that engage contemporary audiences with their cultural heritage, especially as traditional methods often fail to capture the attention and participation of younger generations. Gamification offers a dynamic solution to this challenge, turning heritage engagement into an interactive, participatory, and enjoyable experience (Deterding et al., 2011). However, as gamification is applied to heritage, it becomes crucial that these approaches respect the underlying cultural values and identities of the communities they represent.

This chapter is centred on the dual principles of cultural sensitivity and inclusivity, focusing on how both can be integrated into the gamification of cultural heritage. Cultural sensitivity refers to understanding and respecting different communities' traditions, values, and contexts, ensuring that heritage is represented authentically, without misrepresentation or distortion. Gamified experiences must honour the complex histories and meanings associated with cultural assets (Logan, 2011; Smith, 2006). On the other hand, inclusivity involves creating heritage experiences accessible to all members of society, particularly marginalised groups who may otherwise be excluded from traditional heritage engagement activities. By making heritage experiences inclusive, gamification can play a pivotal role in bringing together communities, fostering a shared understanding of cultural significance, and ensuring that diverse voices and histories are represented within these digital spaces. This inclusivity and cultural sensitivity allow gamification to transcend mere entertainment, becoming a powerful tool for education and social cohesion (Avrami, 2019).

This section examines how cultural sensitivity, and inclusion can be effectively integrated into gamified heritage projects' design and implementation phases. The goal is to enhance engagement and learning and ensure that heritage management practices respect and reflect the diverse cultural identities they aim to celebrate. By incorporating these principles into gamified systems, enjoyable and meaningful experiences could be created, fostering a deeper connection to cultural heritage while promoting a sense of ownership and pride within communities. This exploration will provide a framework for designing gamified experiences that are educational, inclusive, and culturally respectful. Weaving together cultural sensitivity and inclusivity within gamified heritage projects can ensure that these efforts are innovative and socially responsible, helping preserve and promote cultural heritage for future generations.

9.1. Framing Core Concepts in Cultural Sensitivity and Inclusion

Cultural sensitivity and inclusiveness are prominent concepts that emerge when developing an innovative, socially responsible process in gamified heritage projects. Cultural sensitivity plays a fundamental role in preserving cultural diversity and the coexistence of different cultures. In the early 20th century, research in anthropology and cultural relativism, which focused on cultural differences and developing a contextual perspective on cultural practices, beliefs, and values, laid the foundation for cultural sensitivity (Boas, 1911; 1940). The studies on intercultural communication and education have led to a more advanced perspective on cultural sensitivity and its effects on behaviour (Benedict, 1934).

Intercultural sensitivity, a related concept, is a skill that improves individuals' ability to live together in a multicultural environment (Chen, 1997). The concept involves the ability to recognise, respect and appreciate cultural differences and to adapt behaviour and communication styles to those differences in a way that is effective and appropriate in diverse cultural settings (Hammer,2011; Deardorff, 2006). It is based on the conscious and flexible perception of cultural references and enables the development of appropriate and effective behaviour in a context-specific manner (Baker, 2011; Chen, 1997).

Another concept based on the idea of respect and leniency for different cultures and social groups is inclusion. The concept is ideologically linked to the human and civil rights movement for diverse groups. The ideological foundations date back to the 1960s. The politics of recognition first awakened the women's and racial movements, later adding health disadvantages, and today, the politics of sexual identities exist (Dewidar, 2022). The politics of equity and non-exclusion subsequently seeped into corporate, educational and governmental environments to create a world that recognises humanity, celebrates diversity, and makes equity and inclusion (Kohl, 2022).

One of the most basic definitions of inclusion involves allowing different types of people to do something and treating them fairly and equally (Cambridge Dictionary). However, during the last decades, inclusion has focused on certain realities of modern societies that involve the practice or policy of providing equal access to opportunities and resources for people who might otherwise be excluded or marginalised, such as those with physical or intellectual disabilities and members of other minority groups (Oxford Dictionary).

Inclusion has recently become not only an obligation regarding the respect of human rights but also a trend that reflects the level of development of democracy in our countries. Involving people in decision-making processes, tolerance, having the same opportunities, and ensuring access to information, regardless of their social, ethnic, or cultural affiliation, disabilities or problems they face, demonstrates the value and importance of people's opinions in finding the most appropriate solutions for various situations that societies face today. Finally, inclusion in a society where human rights and freedoms are respected makes everyone feel appreciated.

International and European organisations encourage member states to emphasise the involvement of citizens in governance and decision-making processes, to ensure people's access to information, and to develop communication infrastructures so that every person has quick access to public services and the movement and mobility of people. Thus, inclusion today represents a condition for democratic governance in which the opinion of every person matters, and care for all citizens is a priority. In recent years, inclusion has become

part of the sustainable development strategies of countries worldwide in most areas of activity. However, inclusion often appears in strategic education, social affairs, and culture documents.

The concept of inclusion was initially conceived in educational settings. This has shifted on many levels over the past decades, from social, political, and technological changes to an overall change in educating students. The terms used to describe a given 'problem' or 'difference' have evolved, as have the 'labels' assigned to these children, the disciplines and scholarly fields dedicated to their care and development, and the overall strategies for addressing their needs.

Whereas only a few decades ago, the *medical model* of looking at pupils with special needs prevailed, and such pupils were seen more as a diagnosis than as learners, in recent years, pedagogy and education systems have sought to make a breakthrough in this area – the so-called *social model* of difference. A gradual shift from integration to inclusion in school systems is coming to the fore. This means that pupils and students are no longer seen as just a medical diagnosis, a child with a problem or a disability. There is a drive to focus more on the specific needs of these children for inclusion in mainstream society rather than singling them out. So, the change has not just been in the overall approach and view of children with special educational needs. It was necessary to realise that a person with a particular diagnosis is not just defined by it from a medical perspective. Society itself created barriers for people with specific needs. These barriers prevent a person with specific needs from integrating into mainstream life. From integration, therefore, the concept of inclusion is gradually evolving.

Inclusion is defined as a new concept of an educational approach that focuses on the heterogeneity of the group of pupils in the classroom and considers this as a kind of normality. The humane effect of this approach is pointed out, and the overall facilitation of teachers' work within mainstream schools is emphasised. Inclusion brings radical reform in education in several areas. It emphasises that it is built on respect for diversity, whether in terms of gender, nationality, race, language, social background or disadvantage. Inclusive education, unlike integration, does not single out any specific groups of pupils and students.

Instead, it focuses on the individual needs of each student, targeting all students equally. An inclusive school should accommodate all students. It is about changing the way people look at the failure of the school system or the failure of the school system in the case of a particular child. The principle of inclusion implies that mainstream schools should educate children regardless of their physical, intellectual, emotional, social, linguistic or other conditions. Ordinary schools with an inclusive orientation are the most effective means of counteracting discriminatory attitudes. By changing the school and classroom climate, inclusive education enables children to include children with specific needs, including children with severe disabilities (Průcha, 2003). All children from one territorial area attend the same local standard school and are educated together according to their interests, abilities and talents. This entails the practical assumption that schools and entire school systems will be opened to all children and structurally changed to include disabled and non-disabled children and adolescents as inclusive educational settings, enabling them to be educated together.

The conceptual basis for inclusion understood in this way is that humanity is an integrated community of people of different races, nationalities, abilities, disabilities, genders, and religions. Cultural sensitivity and inclusion both focus on the togetherness of different cultures and social groups and aim to foster a culture of coexistence.

9.2. Cultural Sensitivity and Inclusion in the Gamification of Cultural Heritage

Cultural heritage is a comprehensive phenomenon that changes and diversifies under contextual factors such as social, political and ecological influences. It is emphasised by UNESCO (1972) that cultural heritage is the common heritage of all the world's nations, and it is important to preserve this common heritage with its unique components in all the richness of their authenticity (ICOMOS, 1964; UNESCO, 1972).

The concept of cultural sensitivity plays a key role in preserving the diversity of cultural heritage. Cultural heritage, encompassing tangible and intangible elements, is a dynamic and living concept reflecting communities' values, identities, and histories (Smith, 2006). As societies evolve, so does the understanding of heritage, expanding beyond static

monuments and objects to embrace broader cultural landscapes, practices, and traditions that form collective identities (Logan, 2011). Heritage sensitivity involves recognising and respecting the unique historical, social, and cultural contexts that shape how heritage is understood, utilised, and experienced (Avrami, 2019).

Cultural heritage is also targeted by the inclusion phenomenon, which has led to the development of research and activity directions in this field, such as archaeology, public history, and community heritage. The Council of Europe Framework Convention on the Value of Cultural Heritage for Society (Faro, 2005) plays an exceptional role in defining heritage as part of human rights and democracy and in promoting a broader understanding of heritage and its relationship to communities and society:

> "… a heritage community consists 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…" (https://www.coe.int/en/web/culture-and-heritage/faro-convention, Article 2.b)

This Convention encourages people to recognise that artefacts and places are important because of the meanings and uses that people attach to them and the values they represent. In this sense, the Convention draws attention to the fact that all forms of European cultural heritage constitute a shared source of remembrance, understanding, identity, cohesion, and creativity. Even if, at a declarative level, cultural heritage belongs to humanity and that culture unites us, we find a whole series of situations when these areas are misinterpreted, abused in petty interests that lead to conflicts and attempts to justify some decisions that harm humanity, such as Russia's aggression against Ukraine. Therefore, it is essential to consider experience to overcome conflict and hatred and to develop a peaceful and stable society based on respect for human rights, democracy and the rule of law (Article 3, Faro Convention).

Cultural sensitivity and inclusion are two concepts that are also significant in gamification in terms of preserving cultural heritage and transmitting it to future generations. When these concepts are effectively integrated into gamified heritage projects' design and

implementation phases, achieving a more ethical, educational, inclusive, and culturally respectful digital product is possible.

Heritage sensitivity is a critical element, ensuring that the processes of engagement, interpretation, and representation respect and uphold the cultural significance of heritage (Zichermann & Cunningham, 2011). The designers must develop experiences that acknowledge the complex histories and lived realities of the communities associated with that heritage, thereby avoiding superficial representations and ensuring authenticity (Ćosović & Brkić, 2019). In gamified heritage projects, such sensitivity ensures that the narrative embedded within the game aligns with the cultural truths of the community, making the overall experience both engaging and respectful (Deterding et al., 2011).

In gamified heritage experiences, heritage sensitivity is paramount to ensure the experience is interactive, culturally accurate, and authentic. Integrating game-design elements —such as challenges, rewards, and narratives— into heritage contexts requires considering how cultural elements are represented. Gamification can risk reinforcing stereotypes, misinterpreting cultural practices, or distorting historical facts if misused or oversimplified. For instance, a game that presents historical events or traditional customs in a way that strips them of their cultural context or importance may reduce their meaning and potentially alienate the very communities it seeks to engage (Smith, 2006; Zichermann & Cunningham, 2011).

For a gamified experience to be culturally sensitive, it must consider the multiple dimensions of heritage: not only the physical aspects but also the intangible elements such as rituals, language, and social practices. As heritage projects increasingly move into digital platforms, ensuring these intangible elements are accurately conveyed through gamified systems becomes an ongoing challenge. It is essential to balance game mechanics with the nature of cultural narratives, ensuring that these digital heritage representations remain grounded in the realities of the communities they reflect (Logan, 2011; Avrami, 2019).

The core objective of applying gamification in this context is to create an educational experience while celebrating cultural diversity. When done correctly, gamified heritage can foster a deeper understanding and respect for diverse cultures. For example, by

allowing players to engage with historical events or traditional practices through gameplay, participants can gain a sense of immersion that encourages learning and reflection (Deterding et al., 2011). The game design must, therefore, reflect cultural sensitivity by including accurate depictions of practices, beliefs, and cultural significance, all while ensuring that these elements are presented in an interactive, accessible manner (Ćosović & Brkić, 2019).

Gamification provides a compelling avenue for making heritage more interactive and engaging (Deterding et al., 2011). However, the application of gamification in heritage contexts must be guided by heritage sensitivity, ensuring that these digital experiences are engaging, culturally appropriate, accurate, and respectful (Avrami, 2019). Authenticity is one of the core principles of heritage sensitivity in gamified heritage projects. Whether the focus is on tangible heritage, such as monuments and artefacts, or intangible heritage, including customs and oral traditions, these cultural elements must be presented in a way that honours their true significance (Logan, 2011). This process requires extensive collaboration with cultural experts, community leaders, and local stakeholders to ensure that the heritage representation within the game is aligned with the community's understanding of its history and values (Smith, 2006). This collaborative approach is essential in avoiding oversimplification or distortion of cultural elements, which can otherwise lead to misrepresentations that do not reflect the lived experiences of the communities involved (Ćosović & Brkić, 2019).

It is important to understand that cultural heritage is not a static concept; it is deeply embedded in the specific historical, social, and geographical contexts that shape its meaning (Avrami, 2019). The socio-political histories of a region, the spiritual and religious significance of specific practices, and how local communities perceive and interact with their heritage all contribute to the richness and complexity of cultural assets. Therefore, when incorporating gamification into heritage projects, careful consideration must be given to these contextual factors (Logan, 2011). Gamified experiences should reflect the historical accuracy of the heritage in question and how communities perceive and live their heritage in the present day. The game's narrative and mechanics design must respect these nuances

to ensure that players engage meaningfully with the heritage being represented without oversimplifying or distorting its context (Avrami, 2019; Logan, 2011).

A fundamental aspect of heritage sensitivity is the collaboration with local communities. The communities whose culture is being represented must be actively involved in developing gamified heritage experiences. This engagement ensures that the community accurately portrays, respects, and values the heritage (Ćosović & Brkić, 2019). By involving community members in the design process, the gamified experience transforms from an external imposition into a tool for empowerment. It becomes a medium through which communities can share their cultural narratives and traditions interactively and dynamically rather than simply being passive recipients of a heritage interpretation. This collaboration allows for a more authentic representation of heritage that resonates with the community, fostering a sense of ownership and pride in shared heritage (Avrami, 2019).

An important consideration in this context is the need to avoid cultural appropriation. Cultural appropriation occurs when elements of a culture are taken out of their original context and used in ways that distort or trivialise their meaning. This risk is heightened in gamification, as cultural elements might be commodified for entertainment or convenience (Zichermann & Cunningham, 2011). To prevent cultural appropriation, it is crucial to consult with community representatives and cultural experts to ensure that heritage elements are represented with the respect and dignity they deserve. The goal is to use gamification as a tool for education and respect, ensuring that cultural practices, beliefs, and traditions are not reduced to mere game mechanics but are integrated into the game experience in a way that honours their deep cultural significance (Logan, 2011; Zichermann & Cunningham, 2011).

The concept of inclusion and heritage sensitivity is a crucial component of the culture of coexistence in the gamification of cultural heritage. From the educational environment, the principles of inclusion also permeate the gamification space. In this context, the principles of inclusion are applied on two levels. On the one hand, it is about the non-exclusionary participation in the act of 'playing' itself; on the other hand, it is about the formative function of the game itself. In the first case, play has the potential to

remove barriers and promote inclusivity by creating an equal and accessible environment for all. Techniques such as personalisation, transportation, identification, regular feedback and collaboration are used to inspire the involvement of all individuals regardless of their abilities or characteristics. One such example is the inclusion of older people: gamification strategies support this group's social and digital inclusion (Minge & Cymek, 2020). Initially, it was not perceived as enjoyable due to weaker IT skills. Therefore, simple, intuitive and undemanding games started to make practising the skills taught as enjoyable as possible. Gamification principles can overcome stereotypes and prejudices by allowing individuals to express their skills and talents in a safe environment defined by the game's rules. This is helped by the absence of proxemics, which are defined as people's conception, shaping, and use of space in their relationship with each other (Cárdenas et al., 2016). This also eliminates the visual perception of others, including their physical characteristics and especially their difference. Play can prove highly effective in actively promoting the inclusion of people with different needs, abilities or difficulties (De Souza Sombrio et al., 2016; Huang & Lau, 2020; Le Pichon et al., 2024). A review study by Klock et al. (2024) provides insights into how points, challenges, levels, avatars, feedback, goals, and rewards designs impacted different ages, and feedback, collaboration, goals or designs were able to support people with disabilities.

The second case is about supporting societal transformation through gamification (Spanellis & Harviainen, 2021). Several studies have highlighted the educational dimension of gamification (Garcia-Holgado et al., 2019; Wernbacher et al., 2022). Games have different goals and, in the context of inclusion, can pursue reducing stigmatised beliefs and prejudices (Manzano-León et al., 2022). Play then acts as a tool to shape attitudes and behaviours (Peng et al., 2010) through content and its mechanics and playful nature (Bogost & Wright, 2007). Gamification promotes collaboration and teamwork, fostering social inclusion and acceptance of diversity. One of its key benefits is its ability to foster a sense of belonging and engagement.

The motivation to play is based on three principles (Yee, 2006): *achievement*, *social motivation* and *immersion*. The first one is the desire to compete and gain power over others.

In the case of social, the goal is the satisfaction of chatting and helping others, forming relationships and being part of a group (e.g. social networking, cooperation and teams). The third is the desire for escapism, assuming a virtual identity, and discovering secret contents. It is important to consider each environment's specific needs and characteristics and adapt gamification techniques accordingly. While gamification offers several benefits in promoting inclusion and a sense of belonging, it also brings several challenges and concerns that must be considered. When incorporating gamification, it is crucial to ensure that activities and challenges are comprehensive and accessible to all. This means tailoring tasks and objectives to the individual needs of each learner and ensuring that everyone has equal opportunities to participate and succeed (del Olmo-Muñoz et al., 2023). Another fundamental challenge is to avoid over-rewarding and over-reliance on external incentives. Although rewards can effectively motivate learners initially, ensuring that intrinsic motivation develops over the long term is essential. This can be achieved by offering constructive feedback and recognising effort and progress rather than emphasising only tangible rewards. It is important to remember that gamification is not a panacea and is not always effective in all situations or for everyone. Each individual is unique and may respond differently to gamification methods. Therefore, it is important to remain flexible and adapt gamification methods to ensure they align with everyone's unique requirements and characteristics.

The preservation of cultural heritage and the coexistence of different cultures and social groups can be achieved by focusing on cultural sensitivity and inclusion in gamification processes. Gamification also offers structural capabilities for including these concepts in the process. These theoretical discussions must be realised and evaluated practically to evaluate these possibilities.

9.3. The Practical Implications of Heritage

Modern information technologies provide us with faster access to various types of information, their interpretation and presentation in various forms. These technologies have become widely used in the cultural heritage, making the field more attractive and diverse and changing the perception of how the human past is presented. Thus, our project fits perfectly

into these trends, and heritage gamification has become a field of multidisciplinary concern that brings important benefits to the promotion and education of heritage. Cases selected and presented by all the countries participating in the project represent good practices of involving local communities in the designing, developing, preserving and promoting some of the most representative Bulgarian, Czech, Italian, Portuguese, Romanian, Slovak, Türkiye natural and cultural heritage (Miloiu et al., 2014).

One of the four groups of impact criteria was explicitly focused on "Accessibility and inclusion", which allowed the teams involved in the project to draw attention to how the selected games involved different local communities in their development process or involving them in their practical activities. Therefore, the analysis of best practices of the heritage gamification tools drew attention to whether they promote social inclusion and equal opportunities and are not socially discriminatory. In this regard, it was also taken into account whether the game does not have discriminatory elements on the grounds of sex or sexual orientation, age, colour, race, religion, place of origin, nationality, caste, political or religious ideas, disability, social origin or condition, marital status, ethical origin, membership of a national minority, property, generic characteristics, economic resources or is not limited to the type of gamified activity and is open to all audiences who can carry out gamified physical or virtual activities (Smokova et al., 2024).

The cases analysed by colleagues from the Czech Republic represent examples of good practice both from the perspective of valorisation and rehabilitation of cultural heritage and its promotion through various methods, including gamification. Thus, the remains of Lučina village are today presented to the public in the context of the cultural landscape influenced throughout history by anthropogenic factors. Quest is an interactive game that motivates players to learn about local history and heritage. This game does not involve a sizeable local community but facilitates the inclusion of interested parties (game participants) in reconstructing the historical stories of Lučina village inhabitants and houses. Thus, through this game, it could be realised that inclusion in the field of cultural heritage can have various forms and methods, which must be carefully selected and applied

in practice in order to have a lasting impact on heritage education for various groups of participants (Karvánková et al., 2024, pp. 13-15).

The case of "Roman Plovdiv – Urban Game", analysed by Bulgarian colleagues, is one such case. It is also notable because it demonstrates the interaction of historical communities from antiquity to the present. The game offers the possibility not only to travel in time but also to make an analytical comparison regarding how some ancient structures (like the Roman Theatre of Philippopolis) not only survived centuries, how it was preserved and restored, and how they are integrated into the contemporary urban structure, but also how they became a visit card and pride of the local community. At the same time, this game offers the possibility of team participation, which facilitates teamwork, team-building and interaction between participants during and at the end of the game (Smokova et al., (2024b, pp. 41-44).

The cases from Italy are very relevant to the discussion. However, the attention here is drawn to the #ComunicaCultura project in Realmonte, Sicily, which involved students from three high schools who were able to learn about local heritage through gamified elements. Students were tasked with creating 3D models of the Roman villa Durrueli, the Scavuzzo salt mines, and the Scala dei Turchi natural site, using tools like Agisoft Photoscan and Cinema 4D39. This exercise encouraged participants to become key actors in creating and experiencing storytelling products. Ultimately, the students' products were judged based on originality and quality, thus motivating them to enhance their creativity. Thus, including students not just in using some games but in producing them is proof of the usefulness of gamification tools in educational processes, knowledge and active citizenship (Nováková, Aksay, De Leone, 2024, pp. 54-55).

One of the cases discussed by the Romanian team aims at an approach similar to the Italian project mentioned above. Thus, ClimateHeritage is an educational game for secondary-level students aged 13 to 18, which helps them discover their local cultural heritage and how it is affected by climate change. At the same time, the game encourages students to learn about their local heritage through short videos and interesting, fun questions. Respectively, teachers are invited to learn how to build their own game, how

to personalise teaching methods and how to encourage students to actively participate in the implementation of gamification projects (Miloiu, Musteață, 2024, pp. 92-94). So, once again, it is observed how important heritage education is, adapted to some global problems, such as the effects of global warming on cultural and natural heritage, and what is the role of teachers in civic education processes using current methods, such as those related to gamification.

The Aldeia Pintada community project targets a low-density community in Portugal where a local group of young people initiated and implemented an original project on "encouraging younger residents to engage with the community's heritage and providing a platform for recollecting memories by older people". The project included several stages, from documenting the local cultural heritage, including the disappeared one, to creating a digital map using the Google Map platform, informing visitors about the village's key points of interest and showcasing the artistic installations throughout the village. This case demonstrates another way of inclusion, when a group of young people from a low-density locality transforms an initiative into a large-scale project with an impact on the general public, and the "almost forgotten" locality becomes a place of tourist attraction. In this sense, the importance of gamification methods and the role of cultural marketing that must be considered when initiating a project to valorise our cultural heritage can be recognised (Margues et al., 2024, pp. 73-74).

Revúca City Quest game's story focuses on the cultural and educational heritage of one of the Slovak regions. It was developed as a result of cooperation between the local government's cultural department and a regional cultural organisation, also involving a part of the local community with specific skills who contributed to the audio aspect of the game. Blacksmiths created statues of characters around the town. This game is original in combining the past with the present to involve the local community in its development and creating new contemporary works of art concerning some local traditions. Thus, the participants in the game have the opportunity to learn about various aspects of the town's history, analyse some modern statues in the context of some traditional crafts, self-evaluate, and receive feedback. Ultimately, the game is advantageous both for foreigners and for

locals who can learn more about the history and cultural heritage of Revúca City (Danišková, Nováková, 2024, pp. 109-110).

Turkish colleagues analyse the situation in their country from the fact that gamification has become a Social Phenomenon today, which involves groups rather than isolated individuals (Aksay et al., 2024, p. 118). The complex approach to the heritage gamification field is essential. Thus, most of the cases analysed in our project demonstrate the need to include participants in local cultural environments; interaction with historical places with local people is essential in knowing the history and traditions of historical communities. Therefore, one of the primary and common conclusions of the studies was that the game produces positive, emotional effects and facilitates better knowledge when the participant/participants are in the cultural and natural environments themselves. Because the environment, atmosphere, and even the climatic conditions positively impact those involved in these interactive and cognitive games.

9.4. Conclusions

Culturally sensitive and inclusive gamification of heritage is not merely an ethical imperative but a means of redefining how societies interact with their past. Heritage, often contested and fluid, gains new layers of meaning when gamification moves beyond superficial representation to engage with historical complexity, authenticity, contested narratives, and lived experiences. By integrating local voices, indigenous knowledge, and community-driven storytelling, gamified heritage can challenge dominant historical discourses and offer more nuanced, multi-perspective engagements with the past. This approach deepens emotional and intellectual connections to heritage and ensures its continued relevance in contemporary society. Moreover, gamification—when designed with reflexivity and ethical awareness—can transform passive consumption into active participation, empowering communities to reclaim and reinterpret their histories. Rather than reducing heritage to mere spectacle, inclusive gamification fosters critical engagement, bridging the gap between tradition and innovation while ensuring that cultural narratives remain diverse, dynamic, and representative of those who have shaped and continue to shape them.

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EPILOGUE

Drawing together the diverse threads explored throughout this volume, it is evident that the interplay of heritage, gamification, and community engagement represents a powerful strategy for addressing contemporary challenges in heritage conservation. This volume has examined theoretical and applied dimensions through its chapters, emphasising the dynamic nature of heritage and the necessity of inventive strategies for its preservation and transmission across generations.

The initial conceptual framework positioned gamification as an evolving tool that reshapes our interactions with cultural legacies. Rather than treating heritage as a static repository of the past, this volume has reinforced the notion of heritage as a living entity, an ongoing dialogue between tradition and contemporary engagement. In this light, gamification emerges not as a mere embellishment but as a participatory gateway, transforming passive spectators into active custodians of cultural memory. By employing game mechanics, narratives, and immersive experiences, gamification fosters deeper emotional and intellectual connections to history.

Analysing low-density territories, building upon these foundational insights, highlighted challenges like economic limitations, demographic decline, and struggles to maintain heritage relevance. The chapters on this topic illustrated how gamification offers scalable and cost-effective solutions that transcend geographic limitations. Digital applications, augmented reality, and interactive learning experiences have demonstrated their potential to bridge spatial and generational divides, ensuring that even the most isolated heritage sites remain vital components of cultural discourse.

Community involvement, a recurrent theme throughout the book, has been revealed as an essential factor in sustainable heritage management. Analyses illustrated that when communities actively participate in heritage projects, they imbue historical narratives with contemporary significance. The analysis of different participation frameworks underscored

that gamification, when inclusively designed, does not merely entertain but reinforces collective identity and cultural stewardship.

By extending the discussion beyond community contexts, the analysis focused on the educational dimensions of gamification, particularly emphasising pedagogical innovation. Chapters devoted to this topic have underscored the role of game-based learning in enhancing motivation and retention, particularly in studying cultural heritage. By making historical narratives more interactive, gamification extends beyond mere engagement, shaping long-term appreciation and understanding among younger audiences.

These educational outcomes intersect closely with broader considerations of sustainability. The book addressed technological sustainability—ensuring digital tools' long-term functionality and adaptability—and social sustainability, emphasising the ethical imperative to design culturally respectful and inclusive heritage experiences. This dual approach prevents heritage narratives from being reduced to superficial commodities, preserving their complexity and authenticity.

Like the very histories they seek to interpret, methodologies resist simplicity. They unfold in layers, some visible, others buried beneath time's sediment, waiting to be unearthed, deciphered, and perhaps revised again. The conceptual apparatus of this volume has drawn upon phenomenological approaches that acknowledge heritage as an embodied experience where memory, space, and sensory perception intertwine. Likewise, narrative-based methodologies have played a crucial role, recognising that history is not only told but lived, reconstructed, and sometimes contested. Through an interplay of qualitative inquiry, heritage approaches, and participatory design, this work has sought to reflect cultural memory's fractured yet persistent nature, embracing multiplicity rather than seeking singular truths.

However, as with any ambitious endeavour, challenges persist. Gamification is not a universal remedy but a nuanced instrument that must be wielded with care. If poorly implemented, it risks trivialising heritage, reducing profound cultural narratives to mere entertainment. The digital divide remains a pressing concern, raising questions of accessibility and equitable participation. Moreover, the tension between engagement and historical accuracy must not be ignored: how far can heritage be gamified without eroding

authenticity? These challenges necessitate a careful equilibrium between innovation and fidelity, accessibility and scholarly rigour. Greater attention could also be given to exploring ethical frameworks governing gamification practices, ensuring respectful engagement with diverse cultural sensitivities.

As we look ahead, future directions must focus on refining the methodologies used to assess the long-term impact of gamification on heritage preservation. Longitudinal studies could offer insights into behavioural changes in heritage appreciation and community involvement. Further interdisciplinary collaboration—between historians, designers, anthropologists, and technologists—will be instrumental in advancing our understanding of gamification's role in shaping collective memory and identity. To practice heritage preservation is to navigate a labyrinth of meanings. Heritage is an open text, one that invites perpetual reinterpretation. In its most refined form, gamification does not seek to simplify or romanticise the past but to pose questions, challenge perceptions, and make history an experience that unfolds rather than a monument that stands still. In this sense, the work calls for an ongoing dialogue among heritage professionals, educators, technologists, and communities to refine and expand the potential of gamification as a transformative force in cultural heritage.

Additionally, integrating artificial intelligence and machine learning techniques presents a promising direction, potentially enhancing personalisation and adaptive experiences within heritage gamification. Further studies should investigate psychological impacts, including emotional responses and identity formation among participants engaging with gamified heritage experiences. Additional insights could be gained by addressing economic models and the sustainability of gamified heritage projects, particularly their long-term viability and resource requirements.

To play with the past is not to diminish it but to grant it a place in the ever-unfolding narrative of human experience where history, much like a well-constructed game, remains captivating, inexhaustible, and profoundly relevant.

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The submitted manuscript is a very good work in every respect. It is characterised by high scholarly quality, an innovative interdisciplinary approach, and significant applicational potential. The publication represents an important contribution to the international debate on the future of heritage management and sustainable development.

Ing. Viktor Vojtko, Ph.D. (University of South Bohemia)

The main contribution lies in the systematic approach to gamification as a tool for the active involvement of communities in the care of cultural heritage, especially in regions with low population density. Gamification is presented as a strategic tool, not just as an entertaining addition.

Assoc Prof. Mgr. David Fiedor, Ph.D. (Palacký University Olomouc)

The work makes a significant contribution to the current discussion about the possibilities and importance of making cultural heritage accessible to the wider public and its role in the development of local communities.

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