

Bridging Heritage and Technology: Rethinking Cultural Asset Classification through Digitalisation

Sasirada Phanvisetsak¹, Hsiao-Ling Chung^{2*}

¹*Institute of Creative Industries Design, National Cheng Kung University, Tainan, Taiwan*

²*Institute of Creative Industries Design, National Cheng Kung University, Tainan, Taiwan; Email: phanvisetsak.s@gmail.com*

*Corresponding Author: phanvisetsak.s@gmail.com

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ABSTRACT

The rapid advancement of digital technologies has introduced new complexities in heritage management and classification, affecting traditional UNESCO-based frameworks that distinguish cultural heritage as tangible or intangible. This study employs a systematic literature review to explore how existing classification systems address the evolving forms of digital heritage, highlighting key gaps in hybrid expressions and community involvement. Rather than proposing an entirely new classification system, this study presents a conceptual refinement that functionally distinguishes digitisation (documentation and preservation) from interaction (engagement and participation). Clearly delineating these roles provides heritage professionals and policymakers with practical guidance for integrating digital and traditional heritage assets effectively. This approach emphasises ethical stewardship, supports strategic resource allocation, and encourages meaningful community participation. This study concludes by recommending further empirical validation and policy-oriented collaboration, highlighting the potential of this functional framework to foster more inclusive, sustainable, and innovative approaches to heritage management within the context of ongoing digital transformation.

Keywords: Cultural Heritage, Cultural Capital, Cultural Asset, Digitisation, Digitalisation, Cultural Heritage Classification.

INTRODUCTION

The rapid evolution of digital technologies has reshaped cultural heritage management, challenging traditional preservation, categorisation, and public engagement practices. UNESCO's classification system, which has long guided global policy, funding, and standards for heritage management, has historically provided clear guidelines. However, it struggles to incorporate digital heritage effectively. Pérez-Guilarte et al. (2023), Chmutina et al. (2021), and Gradillas and Thomas (2025) argue that frameworks that primarily distinguish between tangible and intangible heritage have become increasingly strained by hybrid cultural expressions introduced through digital tools.

A central issue in current heritage scholarship is the absence of a clear conceptual framework for integrating digital heritage technologies into existing classification systems. Digital heritage assets are typically categorised as digitisation, which involves converting physical cultural assets into digital formats for preservation (e.g., 3D scanning of historical sites), or digitalisation, which refers to interactive digital experiences (e.g., virtual tours of historical sites). To avoid confusion with the broader policy uses of the term digitalisation, this study refers to these tools as interactive technologies. Although widely discussed, their specific impact on classification remains unexplored. Scholars such as Frenzel et al. (2021) and Gradillas and Thomas (2025) emphasise that without a structured framework, digital heritage risks misclassification or undervaluation, hindering preservation efforts and limiting engagement and economic potential.

The first objective of this study is to propose a conceptual framework that functionally distinguishes digitisation from interactive technologies. The second aim is to examine how these technologies serve distinct roles in preserving heritage and engaging the public, thereby revealing shortcomings in UNESCO's current approach. The third objective is to identify the ethical and practical challenges in digital heritage management and offer clear guidelines that support balanced, sustainable, and innovative practices.

To address these aims, this study answers the following three research questions:

1. How does adopting a functional classification of digital heritage technologies improve UNESCO's tangible/intangible heritage dichotomy?
2. What ethical and technical barriers hinder the effective integration of digital technologies in heritage management?
3. How can policymakers balance economic opportunities and creative engagement while maintaining cultural authenticity and community participation?

For clarity, key terms are defined below with examples.

- **Cultural Heritage:** Traditional elements representing community identity, such as tangible artefacts (e.g., historical buildings) and intangible practices (e.g., traditional dances).
- **Cultural Assets:** Elements of heritage with socio-economic value, such as traditional crafts, boost local tourism.
- **Digitisation:** Converting physical cultural assets into digital formats for preservation (e.g., 3D scanning of historical sites).
- **Interactive Technologies:** Digital tools that create interactive cultural experiences (e.g. virtual reality museum exhibits).

Following this introduction, the paper synthesises relevant literature, details the methodology, presents findings that clearly distinguish documentation from interactive technologies, and discusses ethical and practical implications. The conclusion summarises the key insights, highlights the limitations, and suggests future research directions.

Defining Cultural Heritage, Capital, and Assets

Understanding the classification of cultural heritage, especially in a digital context, begins with clearly defining three key concepts: Cultural Heritage, Cultural Capital, and Cultural Assets. While related, these terms highlight different perspectives on how culture is valued and managed.

Historically, UNESCO has shaped the global understanding of cultural heritage by categorising it into tangible and intangible forms (United Nations Educational, Scientific and Cultural Organisation, 1972, 2003, 2009, 2024). Tangible heritage includes physical items, such as historical buildings and monuments, whereas intangible heritage encompasses practices, such as festivals, oral traditions, and traditional dances. Scholars such as Hua (2010) have noted that this simple division often fails to capture cultural practices that blend objects with rituals, rendering strict separation problematic. For example, a traditional dance may involve costumes or objects that carry cultural significance, which is why hybrid forms do not fit neatly into either category. Consequently, the limitations of this binary approach are widely recognised.

To address these challenges, scholars have advocated for examining heritage through both economic and social lenses. Scholars such as Bourdieu (1986) and Throsby (2007, 2010) argue that cultural heritage provides not only historical and artistic value but also clear social and economic benefits, such as supporting tourism and developing creative industries. This synthesis underscores the importance of considering the dual role of heritage in communities.

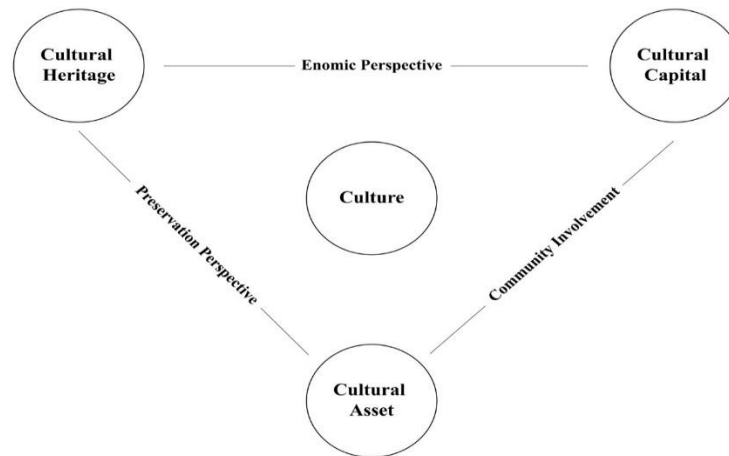


Figure 1. The Trinity of Culture: Heritage, Capital, and Assets.

Source: Author's Conceptual Framework.

This evolving view is captured by the concept of ‘cultural assets’, which focuses on heritage’s role in community development and economic opportunity. For instance, Pérez-Guilarte et al. (2023) show how traditional cultural practices become valuable cultural assets when linked to modern activities such as tourism or digital media. Such scholarship demonstrates that heritage is dynamic and can be actively used for community development. This asset-based framing also resonates with current cultural policies. In the United Kingdom, for example, the Department for Digital, Culture, Media, and Sport (DCMS) recognises digitised heritage content as both a public good and an export-regulated cultural asset. Meanwhile, the European Union’s Common European Data Space for Cultural Heritage supports digitisation infrastructure, metadata standards, and public reuse frameworks, such as the Orphan Works Directive. These initiatives illustrate how cultural assets, particularly digital ones, are now governed not only for preservation but also as licensable, reusable, and economically productive resources for the public good.

However, viewing heritage as a resource for economic and social development raises ethical questions. Lowenthal (2005) warns that a one-size-fits-all approach may overlook local differences and community perspectives, while Chmutina et al. (2021) emphasise the importance of meaningful community involvement in maintaining authenticity and relevance. Collectively, these contributions highlight the importance of ethical considerations alongside economic and social ones.

Table 1 summarises these key concepts and their relationships, clarifying how each contributes to our understanding of cultural heritage.

Table 1. Defining Key Concepts.

Concept	Definition	Example
Cultural Heritage	Traditional elements representing community identity, either tangible (objects) or intangible (practices) (United Nations Educational, Scientific and Cultural Organisation, 2003, 2009).	Historic buildings, traditional festivals
Cultural Capital	Heritage provides social and economic benefits, influencing community development (Bourdieu, 1986; Throsby, 2010).	Increased tourism from cultural sites
Cultural Asset	Heritage elements are valued explicitly for their potential to support community growth and economic opportunities (Pérez-Guilarte et al., 2023).	Handicrafts are marketed to tourists, boosting the local economy.

Source: Author's Conceptual Framework.

By establishing clear definitions and connections between these concepts, this section sets the stage for critiquing existing classification systems in the next subsection. This foundation supports a broader research objective: to develop a new framework that better accommodates digital technology and community involvement, ensuring that heritage remains relevant, accessible, and beneficial in the digital age.

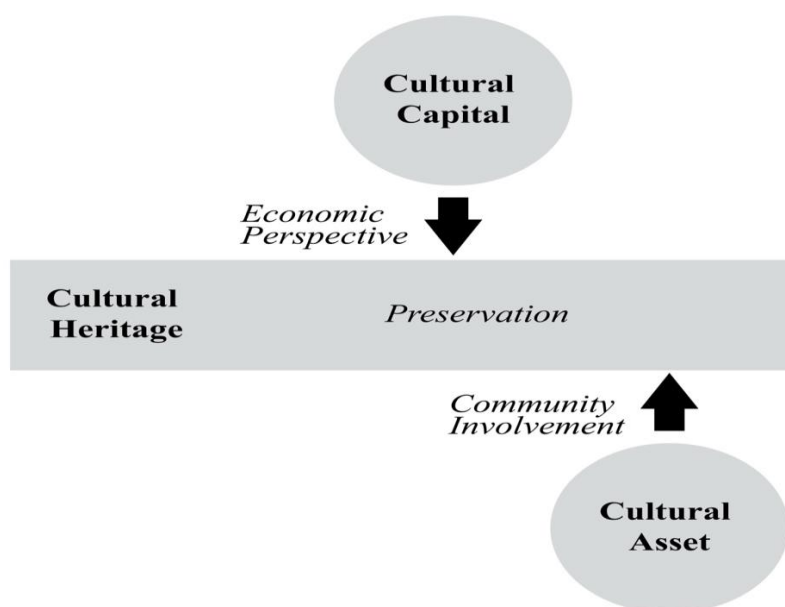


Figure 2. Conceptual Alignment of Heritage, Capital, and Assets in Practice.
(*Source: Author's Conceptual Framework*).

While Figure 1 introduces the theoretical relationship among cultural heritage, capital, and assets, Figure 2 illustrates their practical interplay, showing how both economic value and community involvement contribute to the dynamic preservation of cultural heritage in policy and practice.

Existing Classification Frameworks: UNESCO and Beyond

Building on the conceptual distinctions established in the previous section, this section examines how practical frameworks, particularly UNESCO's, shape the global cultural heritage classification. UNESCO's distinction between tangible and intangible heritage, as outlined in its major conventions, continues to guide international heritage policy. However, as cultural expressions increasingly blend tangible and intangible elements and digital technologies become more prominent, the capacity of this traditional framework to meet contemporary challenges merits scrutiny.

Despite its influence, the UNESCO model has been widely critiqued for its rigidity and limited flexibility. Scholars such as Hua (2010) have noted that many cultural practices defy binary classification by blending objects, performances, and rituals. Others, including Chmutina et al. (2021), have highlighted the model's Western-centric, top-down approach, which may marginalise non-Western traditions and exclude local community voices. These critiques reinforce the need for a more context-sensitive and adaptive classification that reflects cultural diversity.

The rise of digital heritage has further exposed these limitations. Scholars such as Pérez-Guilarte et al. (2023) and Ćosović and Maksimović (2022) observe that digital reconstructions, interactive storytelling, and virtual replicas (e.g., digital twins) blur boundaries between documentation and engagement, necessitating new strategies to classify these hybrid forms.

A growing research consensus, including Frenzel et al. (2021) and Gradillas and Thomas (2025), advocates for clearly distinguishing digitisation (documentation and preservation) from interactive experiences (public engagement). Without this functional clarity, digital heritage risks misclassification or undervaluation, undermining both its preservation and practical use.

Table 2 compares the traditional UNESCO classifications with a more flexible, asset-centric approach, highlighting the key differences and opportunities for adaptation.

Table 2. Comparing Traditional and Asset-Centric Classification.

Aspect	Traditional UNESCO Classification	Asset-Centric Classification
Main Focus	Clear division into tangible (physical) and intangible (practices)	Integration of cultural heritage's economic, social, and symbolic value
Basis of Categories	Material-based (physical objects vs. intangible practices)	Function-based (documentation and interactive engagement)
Role of Community	Primarily top-down; limited community participation	Actively includes the community in decision-making and management

Technology Use	Limited consideration of digital technologies; seen as an add-on	The central focus is on how digital technologies can preserve and engage
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Source: *Author's Conceptual Framework.*

Collectively, these critiques reveal that while UNESCO's frameworks have set foundational standards, their rigidity, Western bias, and limited responsiveness to digital realities create significant gaps in their effectiveness. Thus, the literature highlights the urgent need for a functional and adaptable classification model capable of addressing contemporary complexities.

The Digital Turn in Heritage: Digitisation and Interactive Technologies

Recognising the limitations of traditional heritage classification, scholars have increasingly highlighted the need for frameworks that clearly incorporate digital technologies. This section explores how digital transformation reshapes cultural heritage, emphasising two distinct processes: digitisation and the use of interactive technologies. Clarifying these terms addresses existing gaps and prepares heritage management for contemporary and future needs of the community.

Digitisation refers to the technical conversion of physical cultural objects or intangible practices into digital formats for documentation and their preservation. Examples include the 3D scanning of historical monuments and the digital recording of oral traditions. Scholars such as Frenzel et al. (2021) and Wan Isa et al. (2018) have demonstrated that digitisation plays a role in safeguarding intangible heritage, such as traditional music or dance, ensuring accessibility for future generations. Its primary objective is to capture accurate records to prevent losses or deterioration.

In contrast, interactive technologies actively engage users in heritage experiences that go beyond documentation. These tools include Virtual Reality (VR), Augmented Reality (AR), interactive digital storytelling, and AI-driven exhibitions. Gradillas and Thomas (2025) observe museums increasingly using VR for virtual tours, allowing global audiences to explore remotely. For instance, the British Museum has developed immersive VR exhibitions that enable visitors to virtually explore ancient sites, such as the tomb of Queen Nefertari. These initiatives not only enhance educational outcomes but also align with UK cultural policy goals, promoting digital inclusivity and innovation. These approaches significantly expand public access, engagement, and educational opportunities.

The adoption of interactive technologies accelerated during the COVID-19 pandemic as institutions sought digital solutions to maintain cultural engagement. Abd Hamid (2023) notes that museums and heritage sites rapidly expanded their use of digital tools during this period, creating lasting shifts in how content is presented. Abd Hamid (2023) adds that immersive AR-based exhibitions enrich storytelling and enable remote heritage experiences.

However, digital heritage raises significant ethical and legal concerns. Pérez-Guilarte et al. (2023) highlighted the risks associated with digitising sensitive or sacred content without sufficient community consultation, potentially violating traditional rights. Intellectual property and legal issues also emerge prominently, with Borissova (2018) and the World Intellectual Property Organisation (2013) stressing the importance of clear frameworks to protect digital assets from unauthorised use.

Ensuring authenticity and sustainability in digital heritage also poses challenges. Scholars such as Maietti (2023) and Ye (2024) have emphasised the need to balance innovation with preservation. While VR and AR vividly recreate heritage, maintaining the cultural context and authenticity remains challenging.

Table 3 categorises standard digital heritage technologies by primary function, examples, benefits, and challenges, clarifying these distinctions and concerns.

Table 3. Digital Heritage Technologies: Functions, Examples, Benefits, and Concerns.

Technology	Function	Example	Benefits	Concerns
Digitisation	Documentation and Preservation	3D scanning of historical monuments	Preserves detailed heritage records; prevents cultural loss	Ethical issues in digitising sacred sites; data ownership and IP concerns
Virtual Reality (VR)	Interactive Engagement	VR museum tours	Increased global access; innovative educational experiences	Potential loss of authenticity; misrepresentation risks
Augmented Reality (AR)	Interactive Engagement	AR storytelling at cultural sites	Enhanced user interaction and learning; immersive experiences	Risks of cultural appropriation; accuracy and context concerns

Digital Archives	Documentation and Access	Digital libraries of traditional oral practices	Increased accessibility; ensures cultural continuity	Long-term data storage challenges: privacy and ethical use
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Source: *Author's Conceptual Framework.*

Explicitly differentiating digitisation from interactive technologies addresses the gaps highlighted previously and supports the development of ethical and sustainable frameworks for heritage management. This distinction forms the core rationale for the functional classification model proposed in the next section.

Gaps in Current Approaches and the Need for Functional Classification

As established above, the key limitations of traditional heritage classification systems regarding hybrid and digital forms have been outlined. This section synthesises these critiques to identify significant gaps and highlights the need for a flexible, functional classification model aligned with the study's research questions.

A central issue remains the rigidity and oversimplification inherent in frameworks such as UNESCO's tangible/intangible distinction. Scholars such as Frenzel et al. (2021) and Gradillas and Thomas (2025) emphasise that current models struggle to categorise digital heritage, which frequently blends documentation with interactive experiences. Merely adding digital heritage to existing categories fails to address how technologies such as digital twins blur the boundaries between tangible preservation and intangible storytelling. This ongoing problem underscores the necessity of classification methods specifically designed for digital contexts.

Beyond technical limitations, the lack of community perspectives and ethical considerations presents a critical gap. Many traditional systems rely on top-down, expert-driven approaches that can marginalise local voices and affect authenticity. Chmutina et al. (2021) argue that frameworks lacking genuine community input risk alienating stakeholders and diminishing their cultural relevance. Pérez-Guilarte et al. (2023) further observed that digitising sensitive or sacred heritage without local consultation can violate rights and erode trust.

Legal and policy guidelines for managing digital heritage are also underdeveloped. Borissova (2018) stressed the importance of clear intellectual property rights and robust data management. Hua (2010) notes that current systems were not designed for digital contexts, resulting in significant policy gaps regarding legitimacy, ownership, and stewardship. Lowenthal (2005) advocates for context-specific policies that respect local meanings rather than impose universal classifications.

The accompanying table summarises these critiques and illustrates why a new functional classification model is needed.

Table 4. Key Gaps and Critiques of Existing Heritage Classification Frameworks.

Identified Gap	Explanation	Scholarly Support
Misclassification of Digital Heritage	Existing frameworks inadequately categorise digital forms, resulting in confusion and limited preservation strategies.	Frenzel et al. (2021). Gradillas and Thomas (2025)
Community Exclusion	Top-down heritage management practices often exclude local communities, risking authenticity and relevance.	Chmutina et al. (2021). Pérez-Guilarte et al. (2023)
Ethical Concerns	Ethical risks in digitising sensitive or sacred cultural content without sufficient community involvement.	Borissova (2018); Pérez-Guilarte et al. (2023)
Legal and Policy Gaps	Absence of clear intellectual property rights and digital heritage management policies leading to misappropriation and misuse.	Borissova (2018); Hua (2010); Lowenthal (2005)

Source: *Author's Conceptual Framework.*

The critiques synthesised in Table 4 directly motivate the development of the functional framework proposed in this study. Collectively, these gaps highlight the need for a model that explicitly distinguishes between documentation and engagement, integrates robust ethical standards and local community input, and provides clear policy and legal guidance for the future. Addressing these combined challenges not only strengthens heritage preservation but also enhances community engagement and the sustainable use of digital technology.

In summary, simply expanding traditional categories is insufficient to meet the complex demands of digital-heritage management. A fundamentally new classification strategy that separates digitisation from interaction, meaningfully incorporates community involvement, and provides robust ethical and legal protections is required. Addressing these gaps is essential to this study and directly motivates the functional framework introduced in the next section.

Rationale for a Functional Framework: Bridging Documentation and Engagement

This section introduces the functional framework proposed in this study, which directly responds to the persistent challenges highlighted in the previous sections, specifically the need to address hybrid and digital forms of heritage. Issues such as rigid categorisation, limited community engagement, ethical concerns, and unclear policies underscore the limitations of the existing models. In response, recent scholarship (Frenzel et al., 2021; Gradillas & Thomas, 2025) supports a classification system that clearly separates digitisation (focused on documentation and preservation) from interactive technologies (designed for engagement and participation). This distinction forms the foundation of the new model and directly addresses the previously identified gaps.

In this view, digitisation centres on accurately documenting and preserving heritage assets through methods such as 3D scanning and detailed digital archiving, which help prevent loss and maintain long-term accessibility of the assets. Wan Isa et al. (2018) demonstrate that digitising intangible practices, such as traditional performances, keeps them available for future generations.

In contrast, interactive technologies facilitate public engagement and participation. Abd Hamid (2023) shows that VR and AR experiences immerse users in interactive environments, making heritage accessible and relevant to a broader audience. These tools also support education, remote access, and creative storytelling, thereby creating new opportunities for community involvement.

The separation between digitisation and interaction directly responds to prior critiques of misclassification and vagueness by providing clear guidelines for digital heritage practices. This framework also clarifies opportunities for meaningful community participation, an aspect that Chmutina et al. (2021) identified as critical for authenticity and local relevance. Additionally, clear definitions help organisations implement robust intellectual property and data management policies, as recommended by the World Intellectual Property Organisation (2013) and Borissova (2018).

Furthermore, adopting this functional approach enhances heritage management planning. For example, McKinsey & Company (2019) underscore the value of frameworks that align technological investment with cultural goals, while Ye (2024) provides practical examples of how distinguishing between documentation and engagement helps to allocate resources effectively and sustainably. These functional distinctions are increasingly reflected in UK and EU cultural policies. In the UK, digitisation is supported through metadata protocols and funding strategies from the DCMS. Simultaneously, interactive applications (such as VR reinterpretation) are promoted through export regulations and creative economy incentives. In parallel, EU initiatives, such as Europeana and the European Data Space, distinguish between archival digitisation and participatory digital reuse, providing both legal scaffolding and technical infrastructure for the model advanced in this paper.

Table 5. Functional Classification Framework Advantages.

Identified Gap	Traditional Classifications	Functional Framework Advantages
Misclassification	Overly broad or vague inclusion of digital forms	Precise categorisation between documentation (digitisation) and interactive engagement
Community Involvement	Limited community participation and input	Explicit emphasis on community engagement and interactive experiences
Ethical & Legal Clarity	Insufficient guidelines for digital heritage management	Defined roles facilitate clearer ethical policies and IP management
Strategic Planning	A generalised approach complicates resource allocation	Clear functions enhance targeted resource allocation and sustainable strategies

Source: Author's Conceptual Framework.

In summary, this framework addresses the major critiques of existing approaches and offers practical guidance for heritage professionals and policy makers. By separating documentation from engagement, effective management, ethical practices, and the strategic use of digital heritage resources are supported. The following sections develop and apply this model through the study's methodology, analyses, and discussion.

Research Design and Rationale

This study employs a qualitative, desk-based systematic literature review to examine how established heritage classification systems, particularly UNESCO's, adapt to the challenges posed by digital technologies. The primary focus is on how digitisation (documentation) and interactive technologies (engagement) pose new challenges to traditional classification frameworks. These include concerns regarding community involvement, technological change, and ethical responsibility.

An interdisciplinary approach directly aligns with the research objectives by integrating insights from cultural studies, technology, policy, and economics. Thematic analysis organises the findings into clear themes, directly addressing the complexities of refining heritage classification in the digital age. This methodological approach ensures comprehensive coverage and an in-depth understanding essential for addressing the research questions.

Data Sources and Inclusion Criteria

This study drew on three academic databases: Google Scholar, Scopus, and Web of Science, each offering complementary strengths to provide comprehensive coverage. Google Scholar offers broad indexing of published research, Scopus contributes depth with its peer-reviewed journal focus, and Web of Science provides curated academic materials. Manual searches of repositories such as MDPI, UNESCO, and WIPO supplemented the database results, capturing relevant policy documents and grey literature. ‘Grey literature’ refers to authoritative but non-peer-reviewed materials, such as UNESCO technical guidelines, industry white papers, and institutional reports, that provide critical insights when peer-reviewed studies are unavailable.

The inclusion criteria encompassed English-language sources published between 2010 and 2024, with a direct focus on cultural classification, digitisation, or interactive technologies. Peer-reviewed articles or grey literature providing essential policy insights were prioritised. The exclusion criteria removed purely technical documents without explicit heritage context or those with unclear methodological transparency. However, select foundational sources published prior to 2010 (e.g. Bourdieu (1986) and Lowenthal (2005)) were intentionally included because of their unique theoretical alignment and foundational influence on the study’s conceptual framework. This selection process ensured methodological rigor and relevance.

Search Strategy and Screening Process

The literature search followed the PRISMA guidelines (Moher et al., 2010) to ensure a systematic and transparent process. The review involved four stages: Identification, Screening, Eligibility and Inclusion. The Boolean search terms captured the intersections between heritage and technology.

(‘cultural heritage’ OR ‘cultural asset’ OR ‘cultural capital’) AND (‘classification’ OR ‘framework’) AND (‘digitisation’ OR ‘digitalisation’ OR ‘interactive technologies’ OR ‘digital heritage’).

The initial search yielded 171 records. Duplicates were removed using Zotero. Title and abstract screening excluded other studies. A detailed full-text screening further narrowed this set to 36 eligible documents. Finally, thematic coding and analysis identified and removed sources with substantial thematic overlap or redundancy, yielding a final corpus of 33 articles.

Reference management and coding were supported by Zotero and Excel, ensuring accurate tracking and organisation throughout the review process. This rigorous and transparent approach directly informed the study’s research question and objectives.

Thematic Coding and Analysis

Thematic analysis was conducted in three stages open coding, axial coding, and selective coding to systematically map the literature to the study’s research questions and objectives.

Open coding involved reviewing each source for recurring terms and ideas closely linked to the research questions, such as ‘3D digitisation’, ‘VR interpretation’, ‘cultural participation’, and ‘heritage economy’. These codes were recorded and organised in Excel for transparency and easy reference.

Axial coding grouped the initial codes into broader conceptual clusters, including documentation, engagement, capacity building, ethical governance, and socio-technical alignment. For instance, immersive tools such as VR and AR were grouped under ‘engagement’, while references to digital scanning and archival standards were included under ‘documentation’.

Selective coding refined and mapped these themes directly onto the three main research questions, ensuring that each theme addressed a specific study objective. This process helped clarify how digitisation and interaction serve distinct roles in heritage practice. The codes and themes were reviewed iteratively for clarity and thematic coherence. Although a single researcher conducted the analysis, the codes were revisited at each stage to maintain consistency and reliability. Table 6 illustrates this progression from raw coding to final themes aligned with the research objectives. The table summarises how the initial codes evolved into axial categories and final themes, linking ‘digitisation’ codes, user-focused ‘interaction’ codes, and community-ethics concerns within the functional framework.

Table 6. Sample Coding Framework from Initial Codes to Final Themes.

Initial Codes	Axial Categories	Selective Themes (Final)	Related RQ
digital archiving, 3D scanning, ‘high-resolution imaging’, ‘meticulous preservation’	Digitisation Approaches (documentation, capturing authenticity)	Preservation-Focused Classification (emphasising documentation and long-term preservation of cultural assets)	How does adopting a functional classification of digital heritage technologies improve upon UNESCO’s existing tangible/intangible heritage dichotomy? (RQ1)

immersive VR, interactive media, AI-driven curation, 'public interaction'	Engagement & Creative Industries (facilitating user access, socio-economic growth, interactive participation)	Engagement-Focused Classification (highlighting economic opportunities, interactive experiences, and public participation)	How can policymakers balance economic opportunities and creative engagement with the need to maintain cultural authenticity and community participation? (RQ3)
'community voice', 'ownership', 'authenticity', 'data rights'	Ethical & Community Considerations (highlighting trust, shared benefit, and inclusive decision-making)	Ethical and Technical Barriers (ensuring community agency, ethical stewardship, and technical sustainability)	What ethical and technical barriers hinder the effective integration of digital technologies in heritage management? (RQ2)

(Source: Author's Conceptual Framework).

Peer-reviewed studies were prioritised for the final synthesis, with grey literature used to contextualise policy- and practice-oriented insights. This approach ensured that the thematic framework was robust, relevant, and directly responsive to the study's core objectives.

ETHICAL CONSIDERATIONS

Although this review relied solely on publicly available materials, ethical concerns remain central to the analysis. Special attention was paid to sources that discussed sacred or indigenous heritage. For example, if a source described the digitisation of a sacred object or ritual without evidence of community consultation, it was flagged for further scrutiny or, in some cases, excluded from the synthesis. This ensured respect for cultural consent and the recognition of the right not to digitise certain forms of heritage.

Inclusion decisions adhered to the United Nations Educational, Scientific and Cultural Organisation (2003) and World Intellectual Property Organisation (2013) standards, emphasising community acknowledgement, data sovereignty, and intellectual property rights, ensuring alignment with best practices.

Interdisciplinary Integration

The methodological approach drew on interdisciplinary sources, including cultural studies (e.g., Bourdieu, 1986; Lowenthal, 2005), digital media research (Frenzel et al., 2021; Wan Isa et al., 2018), policy documents (United Nations Educational, Scientific and Cultural Organization, 2003; World Intellectual Property Organization, 2013), and economic analyses (McKinsey & Company, 2019; Throsby, 2010), to enrich both the coding and synthesis processes. Each discipline contributed unique interpretive depth: cultural studies informed the understanding of identity and symbolism; digital heritage literature guided the selection and classification of tools and implementation strategies; policy sources contextualised governance and legal challenges; and economic perspectives addressed asset valuation and resource allocation.

For example, the theme of 'community engagement' was shaped by both cultural studies literature and policy documents, combining insights into symbolic meaning with guidelines for participatory management (Chmutina et al., 2021; United Nations Educational, Scientific and Cultural Organisation, 2003). Similarly, decisions regarding digital tool classification were drawn from both technological studies and policy guidance to ensure relevance to real-world applications.

This interdisciplinary synthesis strengthens the validity and utility of the proposed classification framework by ensuring that it is responsive to both symbolic meaning and practical, policy-driven application.

Concluding Observations

This section outlines a structured methodology that integrates systematic searches, inductive coding, and interdisciplinary synthesis. Aligning methods closely with research questions ensures direct relevance to the identified gaps.

Recent reviews (Chmutina et al., 2021; Frenzel et al., 2021; Gradillas & Thomas, 2025) confirm the necessity of such an integrative approach. This methodological foundation effectively prepares the subsequent results section, highlighting how digital innovations challenge traditional classification and how a functional model can support contemporary heritage management by distinguishing between documentation and engagement.

Reassessing Traditional Approaches in a Digital Context

The results address Research Question 1 by identifying how current heritage classification systems, especially UNESCO's tangible-intangible binary, fail to account for hybrid and digital practices. The thematic analysis

reinforced critiques of rigid classification models and highlighted new challenges emerging in digital contexts. These findings reflect patterns observed across studies on digital reconstructions, augmented performances, and heritage linked to both physical and virtual media.

Historically, heritage classifications have relied on the tangible–intangible distinction outlined in UNESCO conventions (2003, 2009). This framework has influenced the global discourse on preservation, authenticity, and community engagement. Scholars such as Lowenthal (2005), Pérez-Guilarte et al. (2023), and Chmutina et al. (2021) collectively demonstrate that this binary now struggles to incorporate digital technologies, which blur the boundaries between documenting heritage (digitisation) and facilitating public interaction (interactive technologies). Tangible (artefacts) and intangible (ceremonies, oral traditions) heritage increasingly intersect digitally.

Another recurring theme is the Western-centric emphasis in UNESCO-based models, potentially marginalising Indigenous systems that are not easily classified as purely ‘material’ or ‘immaterial’. Hua (2010) and Frenzel et al. (2021) highlight that this limitation intensifies when communities use digital tools for preservation and creative transformation. This underscores the need to address the documentation–interaction divide, which is critical to digital heritage.

Rather than replacing UNESCO’s foundational binary, the earlier functional perspective offers constructive refinement. It explicitly acknowledges the dual role of technology in documentation and engagement, functions that better capture digital and hybrid heritage contexts.

The following subsections further explore how explicitly distinguishing digitisation from interaction provides a practical framework for addressing the community-driven and creative uses of heritage in digital environments.

Functional Classification: Digitisation vs. Interaction

To address the need for clearer classification frameworks, this section details the proposed functional classification, explicitly distinguishing between digitisation (documentation-oriented practices) and interaction (engagement-focused practices).

Digitisation encompasses preservation activities, such as high-resolution scanning, 3D modelling, and digital archiving. In contrast, interaction employs technologies for audience engagement, co-creation and participatory storytelling. Scholars such as Frenzel et al. (2021), Gradillas and Thomas (2025), and Chmutina et al. (2021) emphasise that explicitly separating these functions clarifies both technical and ethical considerations.

Digitisation-centred analyses emphasise authenticity, detail, and preservation (Abd Hamid, 2023; Borissova, 2018), whereas interaction-focused studies highlight opportunities in the creative industry, audience immersion, and participatory storytelling (McKinsey & Company, 2019; Wan Isa et al., 2018). For instance, photogrammetry and digital archives prioritise conservation, whereas AR/VR platforms foster innovative and cultural participation.

Explicitly distinguishing digitisation from interaction not only supports clear policy and resource planning but also clarifies emerging ethical and practical challenges regarding community involvement, intellectual property, and user experience.

Ethical and Technical Barriers

Addressing Research Question 2, the analysis identified critical ethical and technical barriers to digital heritage technologies, including financial constraints, technological obsolescence and ethical risks.

Financial constraints have repeatedly emerged as barriers to equitable implementation, particularly disadvantaging smaller institutions or community-led projects. Technological obsolescence poses challenges for long-term digital preservation, highlighting the need for robust archiving and metadata management (Alkhard, 2024).

Ethical risks associated with digitising sensitive or sacred heritage are also prominent. Pérez-Guilarte et al. (2023) underscore the ethical necessity of genuine community consultation and consent. Without inclusive decision-making, digitisation, and interactive experiences risk reinforcing power imbalances, compromising authenticity, and potentially causing cultural exploitation.

Moreover, the functional classification model helps clarify ethical stewardship and policy alignment (Abd Hamid, 2023; Gradillas & Thomas, 2025). Digitisation efforts require transparency regarding how items are documented and used, whereas interactive technologies demand local input for representation and interpretation. Digital Asset Management (DAM) and intellectual property protection (Alkhard, 2024; World Intellectual Property Organization, 2013) align with this model by safeguarding intangible elements and ensuring culturally sensitive reuse.

Community, Ethics, and Policy Implications

Building on the challenges identified above, this analysis highlights ethical and policy concerns related to ownership, representation, and consent in digital heritage. These issues directly address Research Question 3 and

are especially evident when institutional digitisation practices conflict with community expectations. This conflict is most pronounced in cases involving intangible or sacred materials, raising concerns about authenticity, intellectual property rights, and the risk of exploitation (Chmutina et al., 2021; Hua, 2010; Pérez-Guilarte et al., 2023).

The analysis highlights the critical importance of community rights, ethical stewardship, and clear policy guidelines. By explicitly distinguishing documentation from engagement, the functional model clarifies ethical responsibilities and informs equitable community involvement (Gradillas & Thomas, 2025).

To illustrate how the thematic patterns in the data map onto operational strategies for ethical management, Table 7 synthesises the conceptual contributions of this study with practical policy tools.

Table 7 synthesises how Digital Asset Management (DAM), intellectual property frameworks (WIPO), and the digitisation–interaction distinction practically reinforce one another, guiding ethical and community-oriented digital heritage management.

Table 7. Synergy of DAM, WIPO, and the Functional Classification.

Dimension	DAM (Digital Asset Management)	WIPO (Legal/Policy Protections)	Functional Classification (Digitisation vs. Interaction)
Core Purpose	Ensures systematic categorization, version control, and secure storage of digital files	Offers frameworks for recognizing IP rights, safeguarding intangible cultural expressions	Differentiates documentation from engagement, clarifying how digital technology is deployed in heritage (e.g., archiving vs. VR experiences)
Relevance to Community & Ethics	Provides controlled access, preserving authenticity but not necessarily guaranteeing community ownership	Stipulates legal avenues to protect indigenous knowledge, intangible heritage, and communal rights	Encourages local participation in deciding which assets to digitize or transform, mitigating risk of unauthorised commercial or cultural exploitation
Technical & Practical Focus	Implements metadata standards, AI-driven search tools, and scalable repositories; focuses on file-level integrity	Emphasizes policy instruments and guidelines that prevent misappropriation or unlawful commercialization	Highlights the distinct resource needs for digitisation (specialized scanning) vs. interaction (user-focused design), guiding allocation of budgets and skill sets
Limitations/ Gaps	Lacks built-in ethical guidelines regarding <i>why</i> or <i>how</i> content is digitized or used	Remains broad, relies on enactment at national or local levels; not a classification system per se	Provides a conceptual framework but must be integrated with DAM protocols and IP protections to function effectively in real-world heritage projects
Synergistic Benefits	Incorporates a robust technical backbone for archiving, linking to functional categories for tailored access	Ensures legal recognition of community claims, aligning well with functional classification categories	Fosters an environment where heritage managers can align each asset's digital trajectory (documentation vs. engagement) with both technical best practices (DAM) and legal/ethical standards (WIPO) to ensure sustainability and authenticity

Source: Author's Conceptual Framework.

This synthesis supports applied policy integration and explicitly informs strategic decision-making by heritage practitioners. A clear delineation of digitisation versus interaction provides a robust framework to guide resource allocation, ethical stewardship, and sustainable digital heritage management.

These findings set the stage for the discussion section, which explores ongoing barriers, strategic policy considerations, and the broader implications of refining UNESCO's classification approach.

DISCUSSION

Building on the results detailed previously, this discussion explores how the proposed functional classification addresses persistent challenges in heritage management, as highlighted by both the literature and this study's findings. UNESCO-based classifications have long separated cultural heritage into tangible and intangible forms. However, as scholars have emphasised (Chmutina et al., 2021; Pérez-Guilarte et al., 2023), this binary increasingly struggles to accommodate digital and hybrid expressions of heritage. Researchers, including Gradillas and Thomas (2025), Frenzel et al. (2021), and Wan Isa et al. (2018), demonstrate clearly how the rise of digital technologies reveals substantial gaps in traditional frameworks.

This scholarly consensus supports the value of the functional model. By distinguishing between digitisation (documentation) and interaction (engagement), this approach provides more straightforward guidelines for integrating digital tools into heritage practices. Digitisation activities, such as 3D scanning and digital archiving, focus on preservation (Abd Hamid, 2023; Borissova, 2018), whereas interactive technologies (e.g. AR/VR) fosters innovative engagement and creative industry development (Gradillas & Thomas, 2025; McKinsey & Company, 2019). Rather than replacing the foundational tangible–intangible distinction, the functional model refines and complements it, positioning digitisation and interaction as clear supplementary pillars that help heritage professionals navigate modern digital complexities.

However, several persistent challenges have emerged, highlighting practical limitations that warrant careful consideration. Financial constraints remain significant, as digitisation requires specialised equipment and expertise, and interactive technologies demand ongoing updates and sophisticated hardware. This creates disproportionate disadvantages for smaller institutions and community-driven projects, exacerbating the resource gaps between well-funded heritage sites and less-resourced cultural initiatives (Chmutina et al., 2021; Østerlie & Monteiro, 2020). Furthermore, technological obsolescence poses risks to long-term preservation, underscoring the need for robust archiving, versioning, and adaptable metadata standards (Alkhard, 2024; Rashmi et al., 2023; Re Cecconi et al., 2020).

Ethical risks associated with digitising sensitive or sacred heritage practices have also emerged prominently. Without authentic community consultation, digitisation and interaction technologies risk perpetuating power imbalances, compromising cultural authenticity, and facilitating exploitation (Pérez-Guilarte et al. 2023). Functional classification, which clearly distinguishes documentation from engagement, helps clarify ethical responsibilities. Digitisation demands transparency regarding documentation processes and intended uses, while interactive technologies necessitate meaningful local input on cultural representation (Abd Hamid, 2023; Gradillas & Thomas, 2025). Digital Asset Management (DAM) and intellectual property frameworks further reinforce ethical vigilance, ensuring culturally sensitive reuse and authenticity (Alkhard, 2024; World Intellectual Property Organisation, 2013).

These practical constraints and ethical considerations emphasise the value of the functional model. While this approach addresses many conceptual and operational issues, barriers such as funding disparities, technological capacity, and uneven policy adoption persist and require ongoing research and policy intervention. Nevertheless, the integrated approach combining ethical commitment, community partnership, and functional clarity presents a robust pathway toward more inclusive, resilient, and effective digital-heritage management. These insights set the stage for the summary and future directions outlined in the next section.

Conclusion and Future Directions

Following the discussion, this section consolidates the study's key insights and outlines avenues for future applications and empirical validation. Legacy frameworks, particularly those based on the tangible–intangible dichotomy, struggle with the growing complexity of digital heritage (Chmutina et al., 2021; Pérez-Guilarte et al., 2023). By proposing a functional classification that distinguishes digitisation from interaction, this study advances a more transparent and adaptable approach (Frenzel et al., 2021). Importantly, this functional classification complements and refines UNESCO's tangible–intangible heritage distinction, building on it to better address contemporary digital realities. This complementary framework supports greater authenticity, sustainability, and equity, which is especially beneficial for communities historically marginalised by top-down approaches (Chmutina et al., 2021).

Over the course of the analysis, this study demonstrated that a functional classification clarifies and improves upon UNESCO's heritage dichotomy, addresses ethical and technical barriers, and provides strategic guidance for balancing economic and community considerations. This approach reinforces community agency and ethical oversight through transparent, participatory processes at each stage of digitisation, interaction, and policy development (World Intellectual Property Organisation, 2013). Both preservation-focused practices, such as high-resolution scanning, and engagement-centred tools, such as AR/VR experiences, receive more explicit strategic directions (Abd Hamid, 2023; Gradillas & Thomas, 2025). Implementing Digital Asset Management (DAM) systems and WIPO frameworks further enhances ethical rigour and culturally sensitive reuse.

Moving forward, the empirical validation of this functional classification is critical. Pilot programs in diverse real-world contexts can be used to test and refine the framework, clarifying practical concerns regarding funding, compliance, technological obsolescence, and ethical responsibilities (Hua, 2010; Re Cecconi et al., 2020). Cross-sector partnerships among heritage institutions, technologists, community stakeholders, and policymakers are essential for generating flexible guidelines that balance authenticity, innovation, and economic viability (Abd Hamid, 2023; Chmutina et al., 2021). Insights from these applied experiences should inform future national and international heritage policies, enabling more dynamic and inclusive classification systems (United Nations Educational, Scientific and Cultural Organisation, 2009).

Ultimately, this integrated approach harmonises preservation and meaningful engagement, empowering heritage professionals to leverage digital innovation responsibly without sacrificing authenticity or the community voice. By strategically aligning resource planning, technological infrastructure, and inclusive policy-making, heritage managers can create resilient, community-driven models that sustain cultural essence amid rapid technological change. This comprehensive framework provides a durable template for digital governance, ensuring that cultural expression remains meaningful and resilient for future generations.

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