DESIGNING TRANSFORMATIVE DIGITAL CULTURAL EXPERIENCES TO ENHANCE CUSTOMER WELL-BEING

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Special Issue on Designing for Customer Experiences that Matter

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Abstract

This study investigates how Transformative Digital Cultural Experiences (TDCEs) enhance customer well-being through a customer-centric design approach. It fills three gaps: (1) extending transformative service research to cultural experiences; (2) reframing digital transformation beyond preservation and access, toward intentional customer experience design; and (3) overcoming one-size-fits-all initiatives by stressing personalization, differentiation, and co-creation. Based on 19 expert interviews and 37 digital cases, we identify four audience segments, that are Investigators, Enthusiasts, Nerds, and Novices, and propose matching TDCE formats: In-Depth, WOW, Hook, and Understandable. We also classify TDCEs along cultural content complexity (foundational vs. sophisticated) and digital engagement (accessible vs. innovative). Grounded in the PERMA framework, this novel typology guides cultural organizations in designing inclusive digital experiences that foster individual and collective well-being.

Summary Statement of Contribution: This paper contributes to the marketing and cultural management literature by introducing a novel typology of Transformative Digital Cultural Experiences (TDCEs), categorized by cultural content complexity and forms of digital engagement. Drawing on expert interviews and digital experience analysis, we propose four

design propositions grounded in the PERMA well-being framework. The study provides actionable insights for cultural organizations to enhance audience engagement and well-being, offering practical guidelines for designing sustainable and inclusive digital cultural experiences.

Keywords: digital transformation, cultural experiences, well-being, co-creation, customer engagement, customer experience design

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Introduction

In recent years, cultural heritage has become a central focus of digital investment, reflecting its growing strategic weight. In Europe, Horizon Europe launched flagship initiatives such as the European Collaborative Cloud for Cultural Heritage. In the US, the National Endowment for the Humanities recently supported projects centred on digital access and immersive reconstructions (National Endowment for the Humanities, 2025).

For cultural organizations the challenge is to translate these policy-level investments into meaningful digital practices. Progress, however, remains uneven. Digital spending remains limited (Statista, 2021), and an intense debate has emerged (López-Rodríguez et al., 2024) between those who appreciate technology for its capacity to democratize arts and those who argue that it is often used as spectacle (i.e., for visual or sensory stimulation) rather than substance (i.e., for interpretive, emotional, and cognitive engagement). This is exemplified by certain digital exhibitions such as Immersive Van Gogh, which illustrates the limits of entertainment-focused digital engagement: although they attract large audiences, they are often derided as ‘money grab’ or ‘overpriced gimmicks’ (Batty, 2024). By contrast, the technology design underpinning TeamLab’s environments responds dynamically to visitors, resonating emotionally and inviting reflection, thereby opening the door to lasting societal change.

It is within this landscape that we introduce the notion of Transformative Digital Cultural Experiences (TDCEs), which we define as digitally enhanced cultural experiences that promote well-being. In this paper we take the cultural sector broadly, while drawing primarily on museums and heritage institutions, where the difficulties of designing and delivering meaningful digital experiences are particularly evident. The central managerial challenge, as we see it, lies in designing and delivering TDCEs so that technology is not added as spectacle but becomes integral to creating differentiated, inclusive, and lasting experiences.

This study addresses three major gaps in the literature. First, although transformative perspectives have been developed in consumer and service research (e.g., Transformative Service Research), they have rarely been applied to cultural experiences. We therefore extend this lens to explore how digital cultural experiences can foster individual and collective well-being (Anderson & Ostrom, 2015). Indeed, the cultural domain provides an especially meaningful setting for Transformative Service Research, given its educative and inclusive mission devoted to promoting individual and collective well-being (Addis & Rurale, 2020; Addis, 2023b). Second, most existing work treats technology as a tool for preservation, access, or education, rather than as a component of the customer experience to be intentionally designed (Ouazzani et al., 2023). Third, recent contributions in arts and cultural management highlight that many cultural initiatives, especially the digital ones, still adopt standardized formats that neglect audience diversity. Although audience heterogeneity is widely acknowledged in principle, it is often overlooked in practice by cultural institutions (Carù et al., 2023). As Kerrigan (2023) notes, cultural engagement cannot be addressed through a single experiential model, since audiences differ in their motivations and modes of participation. Wiggins (2023) similarly emphasizes the importance of personalized and participatory design, showing that individuals develop distinct forms of psychological ownership toward cultural experiences. In the same vein, Roederer and Filser (2023) explicitly call for moving beyond standardized hedonism toward individualized, eudaimonic experiences in the digital era. Building on these insights, this study argues that digital cultural initiatives often follow a one-size-fits-all logic, overlooking the diversity of audience needs; the role of personalization, differentiation, and co-creation in experience design remains underexplored. Yet, they are key elements in the design process of digital customer experience that can achieve transformative outcomes (Verhoef et al., 2009).

To address these gaps, we adopt the framework of Transformative Service Research (TSR), which explicitly links service design and delivery to well-being outcomes such as health, inclusion, and resilience (Mende & Van Doorn, 2015; Ostrom et al., 2021). Applying TSR to the cultural sector makes it possible to highlight how digitally supported experiences can enhance resilience, social connection, and cultural preservation, all dimensions that go well beyond conventional service metrics. Whereas customer experience research has stressed the importance of process-oriented design in creating value (Lemon & Verhoef, 2016), TSR positions well-being as the ultimate outcome of such processes. This makes it particularly relevant for cultural organizations, whose mission extends beyond entertainment to include education, inclusion, and community resilience (Grossi et al., 2018; Jensen & Bonde, 2020). This study therefore addresses a core research question: How can digital cultural experiences be designed to maximize their transformative impact on individual and collective well-being? To answer it, we propose a typology of TDCEs, structured around content complexity and the form of digital engagement, and derive three design principles to guide their implementation. Unlike traditional models of digital engagement, which equate innovation with technology adoption (Roederer & Filser, 2023), our framework emphasizes cultural immersion and well-being. We next review the literature, outline the methodology, present findings, and discuss implications.

Theoretical Background: The Design of Transformative Digital Cultural Experiences

This section develops a theoretical framework for TDCEs by addressing three major gaps identified in the literature: (1) the link between cultural participation and well-being, (2) the role of technology as a core experiential element, and (3) the need to account for audience heterogeneity through co-creation. Each pillar is summarized through a corresponding proposition, which together define the foundations of our TDCE typology.

The Transformative Power of Digital Cultural Experiences

The design of digital cultural experiences is marked by a fundamental contradiction. While the relationship between cultural participation and well-being is well established, this connection is rarely translated into the intentional design of digital cultural experiences.

A substantial body of research shows that cultural participation generates multiple forms of well-being: it improves mental and physical health (Grossi et al., 2018) and nurtures psycho-spiritual growth (Neuhofer et al., 2020). Beyond individual benefits, programmes such as *arts on prescription* have demonstrated measurable social and health outcomes (Jensen & Bonde, 2020), while cultural engagement has also helped communities build resilience during wars, crises, and pandemics (Hansen et al., 2015). From a marketing perspective, cultural experiences contribute to personal growth, social connection, and a stronger sense of life purpose (Neuhofer et al., 2020).

Recent contributions broaden this view by showing how cultural encounters enhance well-being through inspiration (An et al., 2022) and by positioning objects and artefacts as mediators of meaning, enabling visitors to engage with and reflect on complex issues (Guerrisi, 2023). Museums increasingly design their spaces to promote inclusivity and social well-being, and technological interventions have been adopted to amplify their transformative role (Addis, 2023a; Calvi et al., 2025). More broadly, cultural organizations have long been understood as providers of experience-centric services, where emotionally engaging and value-creating interactions foster advocacy and loyalty (Lemon & Verhoef, 2016). The experiential nature of cultural consumption remains central in both academic and managerial discourse (Holbrook, 2023). To move forward, however, culture and health must be understood not simply as aesthetic pleasure or absence of illness, but as drivers of resilience, inclusion, and social connection. By adopting a transformative perspective, TDCEs can be intentionally designed to foster well-being at both the individual and community level.

TSR provides a robust conceptual framework for this shift, having explicitly placed well-being at the centre of its agenda (Anderson & Ostrom, 2015; Mende & Scott, 2021). TSR emphasizes both short- and long-term outcomes and shows how services can foster social relationships, inclusivity, and emancipation (Corus & Saatcioglu, 2015). This perspective resonates with cultural mediation, which positions reflexivity, dialogue, and empowerment at the heart of cultural experience design (Addis, 2023a).

Well-being itself has been theorized in multiple ways. It encompasses eudaimonic dimensions such as purpose and life satisfaction, as well as hedonic aspects such as happiness and stress relief (Ryan & Deci, 2001). Alternative frameworks (Sen, 2001; OECD, 2020; Ryff, 1995) offer conceptual breadth but are less actionable for experiential design. The PERMA model (Seligman, 2018) offers an operational framework to translate well-being theory in practical design (Hollebeek & Belk, 2021). Its five dimensions, i.e. Positive Emotions, Engagement, Relationships, Meaning, and Accomplishment, map naturally onto TDCEs: interactive features foster engagement; online communities build relationships; cultural narratives convey meaning; participatory functions foster accomplishment and agency; and together they generate positive emotions. When integrated with practices of cultural mediation, PERMA functions not only as a model for evaluating outcomes but also as a guiding principle for inclusive and reflexive design, supporting both individual flourishing and collective resilience, and ensuring equitable access to cultural value. Building on these insights, we argue that:

Proposition 1**.** The design of TDCEs should prioritize well-being by fostering emotional, cognitive, and social benefits. Such experiences should elicit positive emotions, immerse individuals in rewarding activities, build meaningful relationships, instil purpose, and promote achievement, thereby contributing not only to personal flourishing but also to collective inclusivity.

Technology as a Key Experiential Element to Be Designed

A second limitation in the literature concerns the role of technology in cultural contexts. Much research on digital heritage has treated technology as an accessory, that is an add-on that supports preservation, archiving, or access (Ouazzani et al., 2023) rather than an integral component of the visitor experience. This view has fostered digitization but rarely informed experience design.

Recent studies highlight that digital technologies can foster not only hedonic enjoyment but also eudaimonic, social, and even environmental dimensions (Wong et al., 2023). When designed for participation rather than access, they enhance agency, empowerment, and inclusion (Makridis & Mishra, 2022; Mende & Van Doorn, 2015).

Museums provide fertile ground for this shift: they have evolved from digitizing collections to designing inclusive and immersive environments where technology acts as a catalyst for social connection and reflection (Calvi et al., 2025; Addis, 2023a). This evolution has been enabled by tools such as augmented and virtual reality (Markova, 2025), chatbots (Brown, 2025), artificial intelligence (Corsini et al., 2025), and sensory or contextual aids like tactile interfaces and audio guides (vom Lehn & Heath, 2005).

In line with service-dominant logic (Vargo & Lusch, 2008), cultural organizations can be viewed as service systems where value emerges through co-created experiences (Camarero & Garrido, 2012; Holbrook, 2023; Kelleher et al., 2019; McGinnis et al., 2008; Price & Brodie, 2001). Experience design research shows that such value unfolds across interconnected physical and digital touchpoints that shape emotional, cognitive, and social engagement (Hoyer et al., 2020; Lemon & Verhoef, 2016). In this view, organizations cannot fully control customer experiences but can influence them by designing environments and touchpoints that guide interpretation and foster meaning.

Within cultural contexts, this approach highlights the centrality of digital design in creating hybrid spaces where audiences engage before, during and after the visit (Hoyer et al., 2020).

Technologies such as augmented and virtual reality, artificial intelligence, and chatbots now enable immersive, long-lasting, reflective, and socially connective experiences (Ballantyne & Nilsson, 2017; Brown, 2025; Corsini et al., 2025; Markova, 2025). By bridging knowledge disparities, such technologies also encourage participation and satisfaction among novices (Kelleher et al., 2019), promoting inclusivity and collective meaning-making. Consumers act as valuable external resources who contribute to service innovation when actively engaged in co-design process (Colm et al., 2017; Luyen et al., 2022). Synthesizing these insights, we propose that technology should be conceived not as an accessory but as a transformative context that shapes customer well-being.

Proposition 2. The design of TDCEs should integrate digital technologies, environmental stimuli, and experience providers as constitutive elements of the cultural encounter, ensuring that technology is conceived not as an accessory but as a transformative context that shapes customer well-being.

Differentiating and Co-Creating TDCEs through a Process-Oriented Approach

A third gap in the literature concerns the persistence of a one-size-fits-all logic in the design of digital cultural experiences, which often approach audiences as homogeneous and overlook differences in cultural expertise and digital proficiency. Yet consumer knowledge is essential for meaningful participation (Storey & Larbig, 2018). Variations in both domains create what Kelleher et al. (2019) term the *consumer-heterogeneity conflict* between expert and novice audiences, further intensified by disparities in digital literacy (Alimamy & Jung, 2024). As cultural and artistic services frequently require some prior knowledge, individuals with formal art education perceive and emotionally respond to artworks differently from less experienced audiences (Leder et al., 2004).

Advanced technologies such as AI, IoT, and digital twins expand the possibilities for personalized, inclusive, and immersive cultural experiences (Gong & Ribiere, 2021), yet their

potential often remains underutilized. Prevailing approaches still struggle to close the gap between intended and realized experiences (Verhoef et al., 2009), and in some cases, digital tools create new barriers by increasing complexity (Pires et al., 2015) or distracting visitors from artworks and social interaction (vom Lehn & Heath, 2005). These tensions highlight that technology alone cannot guarantee engagement without considering users' knowledge and literacy.

Consumer knowledge, widely recognized as a critical factor in service design (Storey & Larbig, 2018), encompasses both familiarity based on accumulated experience, and expertise, reflected in task performance, playing a decisive role in value co-production (Brucks, 1986). Building on the distinction between declarative ('knowing what') and procedural ('knowing how') knowledge (Brucks, 1986), and on the domain-specific nature of expertise (Mitchell & Dacin, 1996), two dimensions are particularly relevant. Digital knowledge refers to the procedural skills required to navigate and use technologies effectively, reducing technostress and improving usability (Kumar et al., 2022). Cultural knowledge concerns the conceptual understanding of artistic and cultural content that deepens appreciation and engagement (Alimamy & Jung, 2024). Addressing both digital and cultural knowledge is essential to minimize cognitive overload and disengagement in high-complexity contexts (Mikolon et al., 2015) and to enhance opportunities for value co-creation and well-being.

Importantly, consumer knowledge is not only an individual attribute but also socially situated, shaping expectations about what audiences are presumed to know and how service environments accommodate, or fail to accommodate, knowledge gaps (Llewellyn, 2021). Gamified interfaces can motivate users through levels and rewards, while personalized interfaces and adaptive tasks strengthen competence (Peters et al., 2018). Younger audiences with strong digital skills but limited cultural knowledge benefit from interactive and personalized tools such as augmented reality, whereas cultural omnivores with extensive

cultural knowledge engage more deeply with advanced digital environments. This view is consistent with art as an experience-centric service in which value is 'idiosyncratic, experiential, contextual, and meaning-laden' (Vargo & Lusch, 2008, p. 7), yet often remains abstract, leaving practitioners uncertain about how to operationalize value creation in practice (Kelleher et al., 2019).

Effective service design must accommodate both novices and experts, ensuring accessibility while rewarding depth of engagement. The elaboration likelihood model shows that high-knowledge consumers focus on substantive content, while low-knowledge consumers rely more on peripheral cues (Petty & Cacioppo, 1986). Hence, TDCEs should be differentiated along two axes: (1) the complexity of cultural content and (2) the intensity of digital engagement, to align offerings with audiences' diverse competencies.

Beyond differentiation, a transformative perspective requires conceiving TDCEs as *processes* rather than static outputs. Customer experience research shows that organizations cannot control experiences but can influence them by orchestrating touchpoints across the entire journey (Lemon & Verhoef, 2016). A *design-as-process* approach calls for continuous testing, feedback, and adaptation to bridge the gap between intended and realized experiences (Verhoef et al., 2009). Co-creation plays a central role in this process: active consumer participation across design and consumption stages enhances autonomy, competence, and well-being (Anderson & Ostrom, 2015; Zhang et al., 2020), provided that organizations flexibly adapt resources and ensure accessibility (Storey & Larbig, 2018). Technology can both enable and constrain this process: it empowers users through personalization and connectivity (Xie et al., 2020) but may also exclude less digitally literate audiences (Quach et al., 2022). Balancing innovation and accessibility is therefore crucial. Ethical concerns such as digital fatigue, privacy, and unequal access remain crucial in ensuring that TDCEs fulfil their transformative potential (Quach et al., 2022). By integrating TSR's focus on well-being

with a process-oriented design perspective, TDCEs can evolve as adaptive, co-created experiences that foster both immediate and long-term well-being.

Proposition 3. The design of TDCEs should differentiate experiences according to audiences' cultural and digital knowledge, adopting a process-oriented and co-creative approach that ensures inclusivity, personalization, and sustained transformative outcomes.

Method

To investigate how cultural institutions conceptualize, design and implement transformative digital cultural experiences, we employed a qualitative research design based on (1) expert semi-structure interviews and (2) case study analysis. This methodology allowed us to examine our propositions across various cultural organizations. Expert interviews provided in-depth insights for refining and validating the framework (P1 to P3), while case studies allowed for the evaluation of its practical impact. This approach was chosen to balance comparability across cases with the flexibility required to capture cultural managers situated perspectives. This combined approach ensured a comprehensive examination of the three propositions. This methodological choice aligns with the transformative goal of TDCEs, as the integration of expert perspectives and practical case studies provides a multidimensional understanding of how digital cultural experiences can effectively foster well-being and engagement. Details on participant selection, data collection, and key findings are outlined below.

Expert Interviews

We conducted 19 semi-structured interviews with experts in TDCEs (Bogner et al., 2009; Döringer 2020). Participants were purposively selected for their direct experience in digital transformation projects within the cultural sector, either as managers or external facilitators. To ensure diversity, we drew on international networks to recruit professionals from six

countries (France, Italy, USA, Australia, India, and England). Of the 19 participants, 13 worked within institutions and 6 as external consultants (Table 1).

Table 1: Descriptions of Sample-Interviewed Experts

Expert's Role	***Cultural Service Organization***	***Artistic and Cultural Sector***	***Expert's Key Competences***	***Location***	***Duration (minutes)***
Co-Director, CISO Executive Education Program; Commercialization Advisor, Center for Machine Learning and Health	Carnegie Mellon University	Academic and Research Institutions	Digital Transformation, Digital Marketing	Pittsburgh PA	75
Executive director	Lascaux caves	Archaeological and Historical Sites	Finance-Management and marketing	Montignac-Lascaux, France-	65
Director	Ipogeo dei Cristallini	Archaeological and Historical Sites	Heritage Management	Naples, Italy	75

Executive director	Labo des culture – Non profit organisation	Cultural Organizations and Foundations	Cultural Mediation Management	Bordeaux France	75
75VP Strategic Foresight, and Founding Director Center for the Future of Museums,	American Alliance of Museums	Cultural Organizations and Foundations	Social change, Digital Transformation	Washington DC	45
Secretary General	Kainòn Foundation	Cultural Organizations and Foundations	Cultural Management, Digital Transformation in Cultural Organizations	Rome, Italy	80
Company Director, Interactive Designer	Glassborow Associates' Design Team	Cultural Organizations and Foundations	Creating interactive exhibitions	London, UK	53
Head of Scientific Programs	Cité du vin	Museums and Art Collections	Curatorship, visitor studies	Bordaux, France	65

Head of New Media	Science Museum, London	Museums and Art Collections	Design, Prototyping, and Production of Digital Exhibitions	London, UK	67
Curator and Designer	Victoria and Albert Museum	Museums and Art Collections	Innovating Exhibitions	London, UK	62
Director of Digital Experience	San Francisco Museum of Modern Art; University of New South Wales	Museums and Art Collections	Innovating Exhibitions and Cultural Experiences, Transformational Change in Cultural Organizations	San Francisco, USA and Sydney, Australia	45
Vicedirector	Gallerie di Italia	Museums and Art Collections	Curatorship, Audience Engagement	Milan, Italy	70
Chief Experience Officer	Australian Centre for the Moving Image	Museums and Art Collections	Digital Curation, New/Emerging Media Exhibitions, Cultural Events (Film, Games)	Melbourne, Australia	50

Director	Leonardo's Last Supper Museum	Museums and Art Collections	Heritage Conservation, Management	Milan, Italy	80
Executive director	TMNLAB	Performing Arts and Interdisciplinary Centers	Digital transformation	Paris France	55
Audience Development Director	National Performing Arts Center Carré Colonne	Performing Arts and Interdisciplinary Centers	Mediation, audiences understanding	Bordeaux – France	55
Director	Studio for Creative Inquiry	Performing Arts and Interdisciplinary Centers	Artistic Creation with Technology, Emerging Technologies, Interdisciplinary Work (performance, visual arts, sound, and architecture)	Pittsburgh, PA	50
Head of Culture and Tourism	Lazio Innova SpA	Regional Innovation and Development Agencies	Cultural Management, Technological	Rome, Italy	90

			Innovation in Cultural Heritage		
Marketing Director	Museum of Solutions	Thematic and Innovative Museums	Cultural Marketing, Audience Development	Mumbai, India	80

They represented a range of organizations, from museums and heritage sites to cultural foundations and performing arts centres, with expertise spanning curatorship, audience engagement, digital design, and cultural mediation. The sample was weighted toward heritage institutions, reflecting sectoral differences in digital maturity (e.g., museums digitizing collections vs. theatres producing few stand-alone digital works). All interviews followed a common guide, lasted about an hour, and were conducted in the participants' native language when needed.

Interviews were conducted face-to-face, averaging 65 minutes each. The recordings were fully transcribed, after which the transcripts were translated into English to enable systematic analysis and discussion within the research team. The interview guide was created to elicit study participants' experiences toward transformative digital experiences and questions were developed to capture the various aspects of the implementation of transformative technological cultural experiences. The guide covered challenges of digitization, user engagement, design practices for transformative experiences, and the role of well-being. The open-ended format encouraged participants to share both challenges and strategies, while ensuring comparability across interviews (see Appendix A for details). Professionals were encouraged to share subjective insights into TDCE design, highlighting challenges and strategies they employ. The open-ended nature of these questions allowed respondents to move beyond descriptive accounts and engage in critical reflections, while ensuring

comparability across interviews. All participants consented to recording and to the anonymized use of their quotations, with explicit permission granted when attribution risk was possible.

We analysed the interviews using open and axial coding, iteratively refined to align with theoretical dimensions. Coding was conducted independently by team members and compared in group discussions. Key quotations are italicized in the results, with coding examples in Appendix B. The table shows how interview quotations were coded and mapped onto the PERMA dimensions of well-being (Seligman, 2018; Butler & Kern, 2016), following the same procedure applied across the full dataset. Interviews emphasized outreach, internal awareness, and the need to challenge assumptions, such as viewing technology as a distraction or assuming younger audiences are always digitally skilled.

Case Study Analysis

We conducted case studies of TDCEs to assess how our framework operates in real-world settings and to enrich our propositions. Case study method is well suited for theory development and for exploring complex, context-dependent ‘how’ and ‘why’ questions (Yin, 2018; Eisenhardt, 1989).

Cases were selected through a two-stage process: first, expert interviews identified exemplary projects; second, team brainstorming and specialized cultural innovation platforms (e.g., OECD, Creative PEC, UNESCO) supplemented the list. This yielded 37 cases recognized as good practices across diverse contexts, technologies, organizational scales, and geographies (Appendix C). The sample included both early-stage initiatives and established practices, offering valuable insights for TDCE design.

For each case, we triangulated secondary sources (press coverage, evaluation reports, organizational documentation) and, when feasible, direct experimentation with TDCE

solutions, enabling experiential insights into design and user interaction. This combination provided a multi-perspective understanding of each case.

Data analysis followed a single coding framework, initially derived from expert interviews and the three theoretical propositions. The coding scheme was iteratively refined through comparison across cases and alignment with theoretical constructs, strengthening both analytical rigor and theoretical relevance (Eisenhardt, 1989; Yin, 2018). Guided by the two knowledge dimensions identified in the literature, that are cultural and digital knowledge, each case was coded for three main thematic categories: (1) contributions to well-being (operationalized via the PERMA pillars), (2) experience design integration, as the interplay among technology**,** environmental stimuli, and experience providers, and (3) co-creation mechanisms and engagement processes. The cross-case comparison of these coded dimensions revealed four recurring configurations of audiences and corresponding TDCE formats, that are In-depth, WOW, Hook, and Understandable, which together constitute the data-driven typology presented in the Results section.

We also applied a systematic combining approach (Bogner et al., 2009), shifting iteratively between data and theory (Dubois & Gadde, 2014). Expert interviews refined the framework and substantiated Proposition 1 by identifying a TDCE typology. Case studies illustrated and contextualized these categories, enriching the analysis of Propositions 2 and 3 in diverse organizational contexts. This integration of interviews and cases ensured propositions were continuously refined in alignment with emerging insights, consistent with recent calls for empirically grounded transformative frameworks (Verleye, 2019).

Results

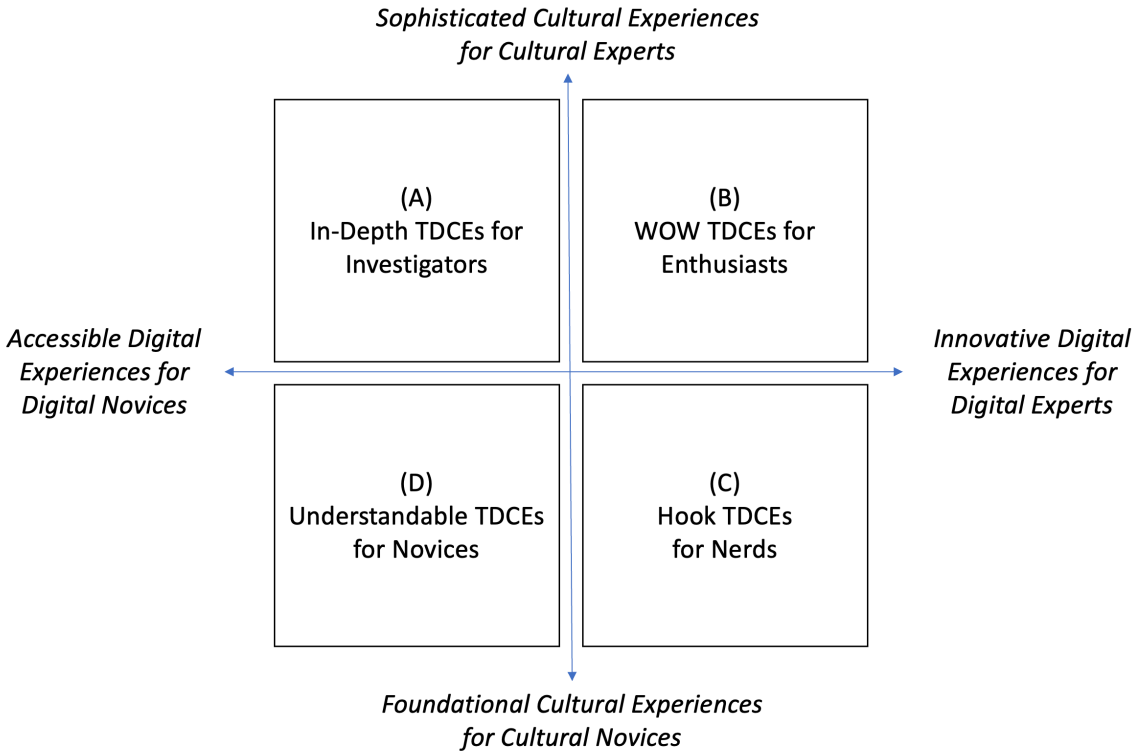
Drawing on 19 expert interviews and 37 cases, we conducted an iterative, data-driven analysis guided by two knowledge dimensions from the literature (i.e. cultural knowledge and digital knowledge). Cross-case comparison revealed four configurations of digital cultural

experiences, that are In-depth, WOW, Hook, and Understandable TDCEs. Each of them is anchored in specific audience profiles (Investigators, Enthusiasts, Nerds, Novices) so that the typology refers to types of experiences, while the audience profiles indicate for whom each experience is most effective.

Experts repeatedly linked participation barriers to asymmetries in cultural and digital knowledge. As the Director of Lascaux Caves observed: '*Older cultural consumers often have extensive arts knowledge but limited digital familiarity. For them, technology may feel like a distraction from the 'real' experience*'

By contrast, younger, digitally fluent audiences were described as blending cultural appreciation with advanced digital skills and being drawn to innovations such as AI, AR, and VR. These patterns informed a positioning matrix with four TDCE types tailored to audience profiles: In-depth (Investigators), WOW (Enthusiasts), Hook (Nerds), and Understandable (Novices).

Figure 1. A Typology of TDCEs



Proposition 1. TDCEs should prioritize well-being

The analysis demonstrates that each type of TDCE contributes to well-being in distinct ways, aligning with the specific needs of Investigators, Enthusiasts, Nerds, and Novices. Importantly, experts emphasized that transformative impact requires prioritizing emotional, cognitive, and social benefits over spectacle, both at the individual and the collective level. Specific results differ across the four TDCEs (Table 2).

Table 2. Contributions to Well-being (PERMA)

TDCE Formats	***Audience Profile***	***TDCE Examples***	***P Positive Emotions***	***E Engagement***	***R Relationships***	***M Meaning***	***A Accomplishment***
In-depth TDCEs	Investigators: cultural experts and digital novices	MIT Timecraft AI system, *Artivive App, Fondazione Prada's 'Calculating Empires', Musée d'Orsay 'Hello Vincent'*	Authentic cultural interaction	Curiosity-led design	Staff & community interaction	Purpose-driven activities	Competences development via feedback
WOW TDCEs	Enthusiasts: digital and cultural experts	*ArtVerse, Kunstmatrix, ArtMingle, British Museum*	Visual awe, excitement	AI-curated journeys, interacti	Digital collaboration	Cultural preservation	Milestone achievements in cultural learning

		RTI, Metaverse Seoul, Cité du Vin, CultuurBewust, Digital Art Train, Museum of the Future		ve content			
Hook TDCEs	Nerds: digital experts and cultural novices	*Playing Pompidou, Arcadia Earth, TechArt Quest, CARNE Y ARENA, Shibuya Platform, Father & Son Game, Socios.co*	Playful exploration, gamification	AR/VR, narrative-driven design	Collaborative discovery	Transformative storytelling	Self-realization

		m, British Museum					
Understandable TDCEs	Novices: cultural and digital novices	*LV8, TeamLab, AI Dataportal, Signal Box Art, DailyArt App, Google Arts & Culture, The Step, NFT projects, Culturespaces, Cleveland MoA, Musée d'Orsay, Dalí Museum*	Sensory-rich inclusivity	Adaptive learning tools, simple steps	Welcoming guided spaces	Relatable cultural content	Gradual learning paths, continuous learning

To illustrate how the five well-being dimensions operate across TDCE formats, we discuss below one representative case per type. Each case shows how positive emotions, engagement, relationships, meaning, and accomplishment are co-produced through the interaction between cultural content, technology, and human mediation. Together, these narratives enrich Table 2 by providing a more detailed view of how TDCEs translate the PERMA framework into concrete audience experiences.

In-depth TDCEs (Investigators).

These experiences foster positive emotions through authentic encounters with cultural artifacts, supported by subtle digital tools. Examples include MIT's Timecraft AI, which reconstructs artistic processes, and the Artivive App, which overlays hidden layers on artworks. Such tools sustain engagement, promote intellectual curiosity, and cultivate meaning through purpose-driven activities. Relationships are strengthened through interactions with knowledgeable staff and online communities, while achievement emerges through competence development. Collectively, In-depth TDCEs reinforce cultural custodianship and intellectual growth.

WOW TDCEs (Enthusiasts).

These experiences inspire awe through immersive visuals and multi-sensory technologies. At Cité du Vin, for instance, extensive digital content sustains exploration and provides personalized meaning. Gigapixel imaging, as highlighted by the Palais des Beaux-Arts curator, *'reveals the richness of the pictorial material, granting the artwork a new aura.'* By combining personalization, collaboration platforms, and social sharing, WOW TDCEs mobilize communities of enthusiasts around cultural preservation and innovation.

Hook TDCEs (Nerds).

Hook TDCEs capture tech-savvy but culturally novice audiences through playful exploration and gamification. Experiences such as CARNE Y ARENA immerse users in the realities of migration, while platforms like Shibuya enable co-creation and voting on narrative developments. These collective dynamics transform Hook TDCEs into spaces for social participation and collaborative creativity.

Understandable TDCEs (Novices).

These formats prioritize inclusivity and accessibility. TeamLab's interactive installations simplify complex content through sensory-rich design, while apps such as DailyArt and Google Arts & Culture build confidence via intuitive learning pathways. As the Secretary General of Kainòn Foundation stressed: *'The comprehension of the TDCE message is fundamental to enabling participation. Clear interfaces and accessible technologies are vital for engaging novices.'* At a collective level, Understandable TDCEs democratize access, broadening participation among audiences traditionally excluded from cultural institutions. Across all types, experts flagged risks such as digital fatigue, overload, and exclusion of less digitally literate users. As the VP Strategic Foresight at the American Alliance of Museums noted: *'Transformation is not only what happens to one person today, but what communities can carry forward tomorrow.'* Addressing these risks requires careful design choices, including accessible mediation and transparent data practices.

In sum, consistent evidence across all cases support Proposition 1. Each TDCE type contributes to audience well-being in distinct ways, aligning emotional, cognitive, and social benefits with different profiles of cultural and digital knowledge. This confirms that prioritizing well-being, rather than technological novelty or spectacle, is the key condition for ensuring that digital cultural experiences become truly transformative.

Proposition 2. TDCEs should integrate technology, environment, and experience providers

Interviewees consistently rejected the view of technology as a mere add-on. As the Head of New Media at the Science Museum in London stressed: *'Tech is the room, not the sticker on the wall.'* Three components repeatedly emerged as constitutive of transformative encounters:

(1) Digital technologies shape agency and interpretation (e.g., MIT's *Timecraft AI* reconstructing artistic processes, the Musée d'Orsay *Hello Vincent* AI dialogue).

(2) Environmental stimuli scaffold engagement through light, sound, and spatial design, producing reflective depth (In-depth TDCEs) or awe (WOW TDCEs).

(3) Experience providers (mediators, educators, tech stewards) translate interfaces, balance complexity, and personalize content. As the Co-Director of CMU Executive Education remarked: *'The human layer closes the loop that tech opens.'*

The configuration of these elements differs across TDCE formats (Table 3).

Table 3. Integration of Technology, Environment & Providers

TDCE Formats	***Audience Profile***	***TDCE Examples***	***Technology***	***Environmental Stimuli***	***Experience Providers***
In-depth TDCEs	Investigators: cultural experts and digital novices	MIT Timecraft AI system, *Artivive App, Fondazione Prada's 'Calculating Empires', Musée d'Orsay 'Hello Vincent'*	Subtle digital enrichment (AI Painter, overlays)	- Lights & sounds - Content narratives through tech -Environmental design fostering reflection and engagement	- Facilitators offering insight and context - Personalized guidance for meaningful connections - Facilitators balancing tech with cultural engagement
WOW TDCEs	Enthusiasts: digital and cultural experts	*ArtVerse, Kunstmatrix, ArtMingle, British Museum RTI,*	Cutting-edge AR/VR, AI-driven pathways	- Immersive visuals and designs that evoke awe and wonder - Multi-sensory tech for	- Facilitators ensure seamless integration - Designers ensure sensory immersion

		Metaverse Seoul, Cité du Vin, CultuurBewust, Digital Art Train, Museum of the Future		heightened engagement - Installations merging tech and content	- Tech experts supervise the interactive systems
Hook TDCEs	Nerds: digital experts and cultural novices	*Playing Pompidou, Arcadia Earth, TechArt Quest, CARNE Y ARENA, Shibuya Platform, Father & Son Game, Socios.com, British Museum*	Gamified AR/VR, interactive platforms	- AR/VR for playful exploration -Using familiar apps to engage young, tech-savvy users - Surprise through inventive tech integration	-Facilitators guiding interactive exploration -Guiding playful engagement - Encouraging social participation & creative experimentation

Understandable TDCEs	Novices: cultural and digital novices	*LV8, TeamLab, AI Dataportal, Signal Box Art, DailyArt App, Google Arts & Culture, The Step, NFT projects, Culturespaces, Cleveland MoA, Musée d'Orsay, Dalí Museum*	Projection mapping, tactile tools, simple apps	- Projection mapping, tactile installations to simplify content -Accessible, sensory-rich environments - Art installations transforming familiar spaces into cultural experiences	- Facilitators simplifying complex content, offering explanations - Accessibility experts ensuring inclusive engagement

In-depth TDCEs (Investigators).

These formats deliver authentic encounters for audiences seeking depth but with limited digital expertise. Technology is used sparingly, enriching interpretation without overshadowing cultural content. The Musée d'Orsay Hello Vincent AI app (2023) drawing on 900 of the artist's letters allows visitors could engage in a dialogue with Van Gogh's persona, creating a unique and intimate interaction with the artist's thoughts. Hybrid formats blending physical and digital experiences show how technology can scaffold critical reflection while mediators guide engagement. For instance, the exhibition Calculating Empires (Fondazione Prada, 2023–2024) blended historical depth with critical reflection on technology and power: *'a genealogy of technology and power from the 16th century to the present day,'* explicitly engaging audiences with the societal impact of artificial intelligence. Their effectiveness depends on the careful integration of environmental stimuli, such as curated lighting, immersive soundscapes, and purposeful spatial design, that establish a strong sense of place and facilitate reflective engagement, with digital tools deployed only when they substantively enrich the narrative.

WOW TDCEs (Enthusiasts).

These experiences rely on immersive visuals, multi-sensory effects, and advanced technologies to inspire awe. At Cité du Vin, extensive digital content sustains exploration, while Gigapixel imaging reveals artistic details 'granting the artwork a new aura.' As the Head of Culture and Tourism at Lazio Innova emphasized, AR/VR-driven installations can *'significantly enhance the audience's connection to cultural stories.'*

A striking example is the Digital Art Train (Mizuma Railway, 2024), where eight projectors cast Akira Hasegawa's digital artworks onto the passing landscape, turning a routine commute into a site-specific immersive experience that amplifies cultural meaning without detracting from authenticity. The British Museum's Reflectance Transformation Imaging

similarly shows how technology changes interpretation by *'revealing inscriptions and textures invisible to the naked eye.'* Other examples demonstrate how integrated design transforms everyday settings into meaningful encounters.

Hook TDCEs (Nerds).

For digitally proficient but culturally novice users, Hook TDCEs merge familiar platforms with cultural narratives. Gamification and AR/VR tools create playful engagement, guided by facilitators who encourage creative experimentation. Examples include the *Playing Pompidou* AR façade, which turned the museum into a musical instrument via Snapchat, *Arcadia Earth*, where immersive storytelling makes climate change interactive, and the *TechArt Quest* project in India, which invited students to design AI-generated art in a collaborative online community.

Understandable TDCEs (Novices).

These formats prioritize simplicity and inclusivity, offering straightforward content through easy-to-use technologies such as projection mapping or tactile installations. TeamLab's interactive environments and public projects like *AI Dataportal_Arch of Light* transform familiar spaces into accessible cultural encounters, while platforms such as *Google Arts & Culture* extend access through high-resolution images and intuitive navigation. Facilitators and accessibility experts play a central role in simplifying complex content, ensuring inclusive engagement, and supporting gradual learning. Outside the walls initiatives are particularly effective in reaching novices in familiar contexts, building confidence and encouraging participation. Digital communities further enhance this process by turning passive consumption into active co-creation, enabling novices to contribute to cultural meaning.

In sum, Proposition 2 is supported by convergent insights from both experts and cases. Transformative impact arises from the integration of technology, environmental stimuli, and human mediation, rather than from any single element in isolation. This finding reframes technology as an *enabling environment* that co-creates meaning and engagement when effectively aligned with context and expertise.

Proposition 3. TDCEs should differentiate by knowledge and adopt a co-creative, process-oriented approach

A recurring insight is that TDCEs cannot succeed with a 'one-size-fits-all' model. Effective design requires differentiation based on audiences' cultural and digital knowledge, complemented by a process orientation where experiences are co-created with participants. Older cultural consumers often combine strong art literacy with limited digital familiarity, while younger audiences expect technology to be central. As the Audience Development Director at Carré-Colonnes put it: *'If you don't design pathways from where people actually are, you design for no one.'* Examples illustrate this principle: MIT's Timecraft supports investigators with deep cultural expertise, Cité du Vin mobilizes enthusiasts with immersive journeys, Shibuya engages digital natives through participatory storytelling, and DailyArt offers novices intuitive learning. Such tailored designs foster inclusive and meaningful engagement.

Yet segmentation alone is insufficient. Transformative outcomes emerge through iterative testing, feedback loops, and authentic co-creation. As the Head of New Media at the Science Museum explained: *'We prototype in public; the audience teaches us what works.'* Concrete practices such as hackathons or participatory storytelling show how audiences materially shape outcomes, while simplified pathways ensure that novices gain confidence and enjoyment. The Secretary General of the Kainòn Foundation captured this orientation

succinctly: *'The primary objective is to demystify complexity and create an inviting entry point into these domains, fostering both learning and enjoyment.'*

Table 4 illustrates how co-creation mechanisms vary across the four TDCE formats.

Table 4. Differentiation, Co-creation & Engagement Mechanisms

TDCE Formats	***Audience Profile***	***TDCE Examples***	***Co-creation Mechanisms***	***Engagement***
In-depth TDCEs	Investigators: cultural experts and digital novices	MIT Timecraft AI system*, Artivive App, Fondazione Prada's 'Calculating Empires', Musée d'Orsay 'Hello Vincent'*	- Leveraging cultural expertise, enhancing interpretation - Tech tools subtly enriching engagement -Personalized experiences to match audience interests	- Highly personalized experiences that meet user expectations and drive engagement - Users share insights and participate in skill-building activities
WOW TDCEs	Enthusiasts: digital and cultural experts	*ArtVerse, Kunstmatrix, ArtMingle, British Museum RTI, Metaverse Seoul, Cité du Vin, CultuurBewust, Digital Art Train,*	- Personalized, AI-driven pathways for exploration - Transparent algorithms for user trust	- Tailored content for personalized exploration - Advanced tech create awe-inspiring,

		Museum of the Future	- Immersive, multi-sensory tech integration	interactive experiences
Hook TDCEs	Nerds: digital experts and cultural novices	*Playing Pompidou, Arcadia Earth, TechArt Quest, CARNE Y ARENA, Shibuya Platform, Father & Son Game, Socios.com, British Museum*	- Interactive, community platforms - AR/VR gamified narratives - Social collaboration and creative digital participation	-Gamified and narrative-driven tools encourage exploration - Users collaborate and share experiences through digital platforms
Understandable TDCEs	Novices: cultural and digital novices	*LV8, TeamLab, AI Dataportal, Signal Box Art, DailyArt App, Google Arts & Culture, The Step, NFT projects, Culturespaces, Cleveland MoA, Musée d'Orsay, Dalí Museum*	- Simplified interfaces and adaptive guidance - Inclusive, step-by-step exploration - Gradual learning paths supporting user confidence	-Inclusive engagement through clear, guided content - Gradual and personalized learning

In-depth TDCEs (Investigators).

Designed for cultural experts who value authenticity and depth, these formats rely on co-creation that leverages existing expertise. Digital tools such as *Timecraft AI* enrich interpretation without overshadowing content, revealing hidden artistic processes through time-lapse reconstructions that make brushwork and creative decisions visible. By aligning with users' interests and allowing exploration at their own pace, these tools enhance intellectual engagement while ensuring the focus remains on cultural content.

WOW TDCEs (Enthusiasts).

Designed for audiences fluent in both culture and technology, WOW TDCEs stimulate curiosity through immersive and personalized journeys. Co-creation is central, with institutions offering expansive digitized content that supports deep exploration. At *Cité du Vin*, visitors can navigate the history and culture of wine through interactive assistants, while the Museum of the Future in Dubai illustrates how VR, AR, and AI can be integrated into physical exhibits to expand discovery.

Hook TDCEs (Nerds).

Designed for digitally proficient but culturally novice users, Hook TDCEs leverage technological fluency to spark curiosity through playful engagement. Surprise, interactivity, and personalization are central to fostering deep engagement. Platforms like *Shibuya* illustrate how participatory storytelling, NFTs and gamification foster collaboration and creative experimentation in the evolving Web3 landscape, while experiences such as *CARNE Y ARENA* use immersive AR/VR to blur the line between observer and participant, generating empathy and cultural reflection in the realities of migration.

Understandable TDCEs (Novices).

These formats emphasize inclusivity and accessibility, empowering novices to shape their cultural journeys through simple, supportive mechanisms. Institutions sometimes involve users directly in design, as in hackathons at the Science Museum to prototype new immersive experiences. Apps such as *DailyArt* and platforms like *Google Arts & Culture* provide intuitive entry points to expansive cultural content, gradually deepening cultural knowledge. By fostering co-creation, Understandable TDCEs transform novices into active participants, promoting personal growth and sustained engagement. Experts also warned of risks such as fatigue or exclusion, but highlighted mitigations including hybrid formats, low-tech options, and transparent data practices.

Cultural organizations can align TDCEs along two dimensions: Cultural Content Complexity (from foundational to sophisticated) and Level of Digital Engagement (from accessible to innovative). Foundational Cultural Experiences (Understandable and Hook) target Cultural Novices who might feel overwhelmed by complex content. These experiences leverage emotional storytelling, immersive environments, and interactive participation to foster cultural engagement. Sophisticated Cultural Experiences (In-depth and WOW) serve Cultural Experts seeking intellectually enriching and exclusive content, focusing on critical analysis, historical interpretation, and authentic cultural connections enriched by dialogue and personalization. Accessible Digital Experiences prioritize simplicity and support for Digital Novices. Gradual learning pathways and user-friendly interfaces are fundamental for fostering engagement. Innovative Digital Experiences captivate Digital Experts by integrating cutting-edge technologies into immersive, customizable cultural narratives, fulfilling their need for innovation and intellectual stimulation.

In sum, Proposition 3 is supported by convergent evidence: differentiation by cultural and digital knowledge is indispensable, while co-creation mechanisms, including digitization,

hackathons, and so forth, ensure inclusivity, personalization, and sustained transformative outcomes.

Discussion

By triangulating expert interviews and case studies, we find consistent support for the three propositions and evidence that TDCEs require a multi-layered understanding of *well-being*. Our findings suggest that well-being cannot be reduced to a single or homogeneous construct. Instead, it unfolds across hedonic dimensions (pleasure, emotional relief, entertainment), eudaimonic dimensions (meaning, self-development, purpose), and collective dimensions (social inclusion, community resilience). Importantly, these dimensions coexist in a state of productive tension: what generates hedonic well-being for some (e.g., immersive spectacle) may induce fatigue or superficiality for others, while eudaimonic outcomes often demand cognitive effort that risks alienating less prepared audiences. Recognizing this ambivalence moves beyond celebratory views of technology and underscores the necessity of balancing multiple well-being goals. The distinction between individual and collective well-being emerged as a central axis across all three propositions. At the individual level, TDCEs foster hedonic and eudaimonic benefits, that are positive emotions, engagement, learning, and personal accomplishment, by aligning technological design with users' cultural and digital competencies. At the collective level, TDCEs create social value by promoting inclusion, empathy, and community resilience. Evidence from other service domains reinforces this perspective: research on transformative retail services shows that initiatives enhancing well-being also increase loyalty, particularly when perceived as altruistic (Troebs et al., 2018), while studies of co-creation in retail ecosystems demonstrate that the effects of well-being extend beyond individuals to communities (Gardiazabal & Bianchi, 2021). These findings highlight that collective well-being arises when audiences share interpretive and emotional experiences that strengthen social bonds and cultural continuity. The transformative potential

of TDCEs thus resides not only in enhancing personal satisfaction but also in building shared cultural capacities that extend beyond individual encounters. Integrating both levels of well-being therefore represents a defining contribution of this study, situating digital cultural experiences within a broader framework of social transformation.

Proposition 1 (P1) affirms that prioritizing well-being ensures that TDCEs foster not just attendance but individual flourishing and collective inclusivity. This directly addresses a gap in TSR, where cultural services have been largely absent from the conversation. By applying the PERMA model to TDCEs, we show how cultural encounters can be deliberately structured to produce transformative effects on audiences.

Proposition 2 (P2) emphasizes the integration of technology, environment, and providers, positioning digital not as a mere accessory but as a constitutive element of cultural encounters. This addresses a second gap in service and cultural research, where technology has too often been treated as an isolated tool rather than as an interdependent factor co-shaping experiences with human mediation and environmental stimuli.

Proposition 3 (P3) demonstrates that differentiating and co-creating TDCEs according to cultural and digital knowledge makes it possible to sustain inclusive, personalized, and transformative outcomes. This fills a third gap in the literature by replacing demographic segmentation with a knowledge-based approach that is both more actionable and more consistent with co-creation principles. It also advances the view that cultural digital engagement is not static but evolves through learning and participatory practices.

Together, these insights provide a robust framework for the design of TDCEs, grounded in empirical evidence and directly addressing the challenges raised by practitioners and observed in practice. By embedding well-being as a multidimensional, ambivalent, and measurable construct at the centre of cultural experience design, the framework contributes both

theoretically and practically to the ongoing debate on how digital transformation reshapes cultural services.

Grounded in theoretical foundations, expert perspectives, and practical case studies, this study offers a holistic framework for designing TDCEs and contributes to several strands of literature. First, we extend TSR by showing how cultural services, often neglected in this field, can be conceptualized as arenas for fostering hedonic, eudaimonic, and collective well-being. In doing so, we critically acknowledge that TDCEs can also generate exclusion, fatigue, or superficiality, inviting scholars to adopt a more nuanced and less normative understanding of transformation. Second, we contribute to customer experience and service design research by proposing a typology of TDCEs that integrates cultural and digital knowledge as segmentation criteria. This typology introduces a dynamic perspective: consumers are not fixed in their profiles but can evolve across categories through exposure, literacy, and co-creation. Third, we advance the debate on co-creation by framing it as a substantive mechanism rather than a symbolic gesture. Our findings show that co-creation practices, such as participatory storytelling, user-generated content, or collaborative interpretation, enhance perceptions of authenticity and inclusivity, while also creating managerial challenges regarding scalability and sustainability. Finally, this study refines prior research on experience-centric design by highlighting four key elements that differentiate TDCEs from traditional cultural experiences: (1) customer drivers, (2) environmental stimuli and experience providers, (3) co-creation mechanisms and engagement, and (4) well-being outcomes. These elements collectively represent a shift from static and uniform engagement models to dynamic personalization and participatory ecosystems, aligned with the evolving expectations of digitally engaged audiences.

Future research agenda

Based on our analyses, we propose a research agenda that advances service research for cultural organizations and connects our propositions to theoretical gaps and practical challenges. Table 5 summarizes this research agenda, enriched with audience-profiles descriptors that illustrate how the TDCE typology can guide further studies. By linking propositions, gaps, and future directions, it consolidates TDCEs as a coherent domain within transformative service research.

Table 5. Research Agenda Connecting Propositions, Contributions, and Future Directions

Proposition	***Theoretical Contribution***	***Focus of Future Research***	***Illustrative Research Questions***
P1. TDCEs should prioritize well-being	Establishes well-being as a multidimensional construct (hedonic, eudaimonic, collective) and introduces the PERMA framework to cultural service research.	Examine trade-offs and synergies between individual and collective well-being outcomes.	How do the dimensions of the PERMA model (Positive Emotion, Engagement, Relationships, Meaning, Accomplishment) interact to shape TDCE outcomes? How can digital technologies be used to measure and enhance individual and collective well-being in TDCEs? What trade-offs emerge between hedonic, eudaimonic, and collective well-being across different audiences? How can cultural organizations balance their dual mission of entertainment and education while fostering well-being?
P2. TDCEs should integrate technology,	Reframes technology as an enabling environment for meaning-making rather	Investigate the interplay between digital	How do technology, environmental stimuli, and human providers interact to generate

environment, and experience providers	than a tool; extends TSR to hybrid (physical–digital) contexts.	mediation, spatial design, and human facilitation.	inclusive and transformative cultural experiences? How can cultural organizations manage risks of sensory overload or digital fatigue in immersive environments? What competences are required from staff to mediate and translate digital tools into meaningful experiences? How can physical and digital stimuli be harmonized to enhance engagement and authenticity?
P3. TDCEs should differentiate and co-create experiences	Introduces knowledge-based segmentation and a process-oriented model of co-creation, linking user literacy to sustained transformation.	Explore evolutionary learning and participatory design in TDCEs over time.	How can cultural and digital knowledge serve as bases for segmenting audiences and tailoring TDCEs? How do co-creation mechanisms (e.g., user-generated content, participatory storytelling) influence perceptions of authenticity and engagement? To what extent do audiences evolve across knowledge-based profiles, moving from

			Understandable to In-depth TDCEs? How can policymakers and organizations support inclusive co-creation while safeguarding accessibility and equity?

P1 / Well-being**.** Future studies should examine how hedonic, eudaimonic, and collective well-being interact in cultural contexts. This includes investigating potential trade-offs between pleasure-driven and purpose-driven outcomes, as well as between individual and social well-being. Longitudinal studies could clarify whether short-term emotional arousal leads to lasting resilience and inclusion. Quantitative measures are also needed to assess the magnitude of transformative effects across different TDCE types. Furthermore, exploring how the PERMA dimensions operate in hybrid contexts (physical–digital) could provide insights into designing experiences that balance entertainment with education.

P2 / Technology, environment, and providers. Research should investigate how these three components interact dynamically. While digital tools often receive primary attention, our findings highlight the indispensable role of human mediation in making technology meaningful. Comparative case studies could examine how providers translate complex technologies for diverse audiences and how environmental design (e.g., sensory cues, spatial affordances) enhances or constrains engagement. Future work should also assess the risks of digital overload and explore strategies to harmonize physical and digital stimuli in inclusive ways.

P3 / Differentiation and co-creation**.** Further research is needed on how cultural and digital knowledge can serve as reliable bases for audience segmentation and experience design. One line of inquiry could explore how knowledge evolves through repeated participation, shifting audiences from Understandable to In-depth TDCEs. Another promising avenue is the study of co-creation mechanisms, including user-generated content, participatory storytelling, and collaborative interpretation. Comparative analysis across segments and cultural contexts could reveal which practices most effectively support empowerment and authenticity.

To consolidate TDCEs as a research field, future work should address several overarching issues. First, there is a need to develop new metrics that go beyond attendance and engagement to capture transformative well-being outcomes. Such metrics should integrate emotional resonance, social connection, and long-term learning. Second, research should investigate how digital literacy, among both staff and audiences, mediates the impact of TDCEs. Designing scalable training programs could become a crucial enabler of inclusion. Third, policy-oriented studies should explore how cultural institutions, governments, and technology providers can collaborate to ensure that digital cultural innovation remains accessible, ethical, and sustainable.

Overall, advancing this agenda requires methodological pluralism. Ethnographic work can uncover the nuances of audience experience, experimental studies can test the causal effects of specific design choices, and longitudinal approaches can capture transformations over time. By adopting this diversified research program, scholars can provide actionable insights that both strengthen theoretical foundations and inform managerial practice.

Managerial Implications for Cultural Service Organizations

This study provides actionable insights for cultural service organizations seeking to leverage digital transformation while maintaining inclusivity and long-term relevance. Our framework highlights that the value of TDCEs does not lie in technology per se but in the ways cultural narratives, environments, and human mediation converge to foster diverse forms of well-being.

From a managerial perspective, three sets of implications stand out.

First, align digital design with audience profiles**.** Organizations must segment audiences not only by demographics but by their cultural and digital knowledge. This segmentation allows for differentiated strategies. Large institutions with ample resources can prioritize WOW TDCEs, where immersive and innovative technologies (e.g., VR, AR, AI-driven storytelling)

foster awe, engagement, and social visibility. These institutions are well positioned to experiment with cutting-edge solutions, provided that the investments are aligned with audience needs and cultural objectives. Medium-sized organizations can strategically develop In-depth or Hook TDCEs, blending digital innovation with interpretive depth. Partnerships with universities or technology providers can help them access advanced solutions without bearing prohibitive costs. Finally, small or community-based organizations should emphasize Understandable TDCEs, prioritizing accessibility, simplicity, and strong human mediation. Low-cost tools (e.g., mobile apps, projection mapping, social media co-creation) can democratize access while safeguarding inclusivity. Second, balance innovation with accessibility. While adopting advanced technologies may attract digitally literate audiences, managers must avoid excluding less proficient groups. Our findings underscore the need for adaptive design, where experiences are scalable across different literacy levels. For example, guided modes or layered content can ensure that both expert users and novices find value. Investing in digital literacy programs for both staff and audiences further reduces the risk of digital fatigue and fosters sustainable engagement. Third, reframe co-creation as a managerial practice. Too often, co-creation is treated as symbolic participation. Our evidence shows that authentic co-creation, such as collaborative storytelling, user-generated exhibitions, or participatory feedback loops, enhances perceptions of authenticity and deepens engagement. However, these practices require managerial systems for moderation, evaluation, and scalability. Organizations must therefore allocate resources to manage co-creation processes effectively, ensuring that they contribute to both audience empowerment and organizational objectives. Finally, managers must integrate TDCE design with well-being goals. Applying the PERMA model as a managerial compass ensures that digital strategies are not driven by technological fashion but by their potential to foster positive emotion, engagement, relationships, meaning, and accomplishment. This perspective encourages

cultural leaders to evaluate digital investments critically, balancing financial cost with social value and aligning innovation with their mission to enhance both individual flourishing and collective resilience.

Limitation and Future Directions

While this study provides a robust framework for designing TDCEs, several limitations should be acknowledged as opportunities for future research. First, scope of cases. The empirical base is skewed toward museums and heritage institutions, with limited representation of performing arts and cross-disciplinary initiatives. Most importantly, the absence of low-tech or community-based cases limits the generalizability of our findings for smaller organizations with scarce resources. Future studies should therefore investigate contexts where digital adoption is minimal, assessing whether our typology remains valid and how it might be adapted. Second, pace of technological change. The rapid evolution of digital tools raises concerns about sustainability. Organizations may struggle to update infrastructures continually, and future research should explore models of incremental innovation that balance novelty with long-term viability. This requires attention to cost–benefit trade-offs and adaptive strategies that prevent obsolescence. Third, measurement of well-being. Our qualitative design has illuminated how hedonic, eudaimonic, and collective well-being emerge in TDCEs, but it does not allow precise quantification. Future research should develop robust, multidimensional metrics to capture short- and long-term effects of TDCEs, integrating emotional resonance, social connectivity, and sustained cultural involvement. Mixed-method approaches could combine self-reports, behavioural data, and physiological measures to strengthen validity. Fourth, ethical and authenticity challenges**.** The integration of digital technologies raises issues of data privacy, intellectual property, and authenticity. Audiences may perceive digitally mediated experiences differently from traditional encounters, sometimes questioning their credibility. Research should address how

different demographic and cultural groups interpret authenticity, and how organizations can build digital trust by adopting transparent and ethical data practices. Fifth, risk of digital fatigue. While immersive formats offer high engagement, they may also contribute to overexposure and disengagement. Building digital literacy within organizations and among audiences can mitigate this risk, fostering critical and reflective engagement. Future research should develop guidelines for balancing immersion with well-being, particularly in long-duration or repeated experiences. Finally, geographic scope. Our cases are concentrated in Europe and North America, limiting cross-cultural generalization. Comparative studies across regions, especially in the Global South, are needed to assess how cultural, technological, and institutional contexts shape TDCE adoption and outcomes.

Taken together, these limitations highlight the need for a comprehensive research program that integrates qualitative depth with quantitative breadth, explores both high-tech and low-tech contexts, and evaluates TDCEs through the lens of long-term societal impact.

Conclusions and Recommendations

This study has introduced a typology of TDCEs structured around cultural and digital knowledge and articulated three propositions that frame their transformative potential. By placing well-being at the centre, integrating technology with environment and providers, and emphasizing differentiation and co-creation, we show how digital cultural experiences can move beyond access and efficiency to become ecosystems of transformation. The theoretical contributions include extending TSR into cultural contexts, operationalizing well-being as a multidimensional outcome, and providing a novel segmentation framework. The managerial contributions consist of concrete recommendations tailored to organizations with different resources, ensuring that digital transformation supports, rather than undermines, their mission to foster inclusion, meaning, and cultural resilience. Ultimately, our findings recommend that digital initiatives should not be conceived as add-ons or technological showcases. Instead,

TDCEs should be designed as co-created, adaptive ecosystems, where cultural narratives, digital tools, and human mediation converge to enhance both individual flourishing and collective well-being. The future of cultural organizations hinges on their ability to deliver innovative and meaningful experiences. The TDCE typology not only challenges conventional digital engagement models but also highlights how digital cultural interactions can serve as pathways to enhanced well-being, addressing both individual and collective dimensions of cultural participation. We hope that our TDCEs will serve as a valuable tool in helping these organizations navigate the evolving cultural landscape and meet emerging challenges, 'leaving no one behind.'

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Appendix A: Interview Protocol

The interview protocol shows the list of topics addressed in the interviews with the cultural services organizations

A. Context and Current Practices

- 1. What digital technologies (e.g., AR/VR, AI, gamification) are most commonly used in cultural experiences today, and how are they applied?
- 2. How do cultural organizations integrate innovative digital tools without compromising the authenticity of cultural contents and artifacts?
- 3. Are managers and staff in cultural institutions equipped with the digital and experiential design skills required for TDCEs? What specific training or competencies are lacking?

B. Best and Worst Practices

- 4. Can you describe specific examples of highly successful TDCEs worldwide? What design features or strategies contributed to their success?
- 5. Can you provide examples of TDCE projects that failed to meet expectations? What were the design, management, or technological issues that led to their failure?

C. Design Challenges and Opportunities

- 6. What are the most significant challenges (e.g., budget constraints, technology limitations, audience engagement) in designing and implementing TDCEs?
- 7. Which enabling conditions (e.g., cross-disciplinary collaboration, funding, technological infrastructure) are essential for delivering impactful TDCEs?
- 8. In what ways can consumer feedback and participation be effectively incorporated into the design and development process of TDCEs?

D. User Engagement and Co-Creation

- 9. What are the most effective engagement strategies (e.g., gamification, interactive storytelling, user-generated content) for involving users in TDCEs?
- 10. How can TDCEs foster meaningful social interaction among participants, and why is this important for their overall impact?

E. Audience Segmentation and Personalization

- 11. How should TDCEs be customized for different audience segments (Investigators, Enthusiasts, Nerds, Novices) to maximize engagement and learning outcomes?
- 12. How does personalization (e.g., adaptive content, interactive interfaces) enhance user engagement and satisfaction in TDCEs?

F. Design Elements and Experience Delivery

- 13. Which specific environmental stimuli (e.g., sensory design, spatial layout) and experience providers (e.g., cultural mediators, digital facilitators) are most effective in enhancing TDCEs?
- 14. What practical methods can cultural organizations use to facilitate co-creation with audiences during TDCE design and delivery?

G. Well-Being and Impact

- 15. How are the PERMA well-being dimensions (Positive Emotion, Engagement, Relationships, Meaning, Accomplishment) practically incorporated into TDCEs to enhance user experience?
- 16. Which design strategies most effectively promote both individual well-being and social cohesion in digital cultural experiences?

H. Future Directions

- 17. What emerging technologies (e.g., metaverse, blockchain, AI-driven personalization) are likely to shape the future of TDCEs?

- 18. How can cultural organizations remain agile and responsive to rapid technological changes while maintaining meaningful and impactful user engagement?

Appendix B: Illustrative Coding Table (PERMA Framework)

Quotation	**Initial Code**	**Axial Category**	**PERMA Dimension**
"Museums … engage people with artworks, stimulate the senses with unique works of art, and disseminate knowledge [which] contribute to visitors' well-being"	Emotional stimulation	Aesthetic emotions	**Positive Emotions**
"Just 3 minutes of viewing art online can alleviate loneliness and anxiety and improve mood"	Art reduces loneliness	Emotional relief	**Positive Emotions**
"Hedonic products consumption leads to higher levels of positive emotions"	Hedonic pleasure	Emotional well-being	**Positive Emotions**
"Touching a butterfly in one room, a participant can connect to others as the butterfly moves to new rooms and new participants"	Interactive play	Immersive flow	**Engagement**
"Digital storytelling enhances the experiential involvement of the visitors"	Storytelling	Deep involvement	**Engagement**
"The theater is a collective ritual. The final applause is just that: being part of a single body … Covid has taught us how important it is to feel part of a community"	Collective ritual	Social bonding	**Relationships**

"Museums are inherently social experiences … decisions about the deployment of novel technologies … have to make sure they work so that people can enjoy their engagement with them"	Social enjoyment	Shared cultural experience	**Relationships**
"People feel close to others"	Feeling loved	Social connectedness	**Relationships**
"Understanding where we have come from contributes to a sense of belonging … anything that deepens the understanding of our past contributes to our understanding of selves and others"	Historical awareness	Sense-making	**Meaning**
"Cultural experiences reflect perspectives on societal topics, developing responsibility"	Educational responsibility	Societal impact	**Meaning**
"Social media used to share consumers' art experiences are empowering and democratizing means that generate identities"	Digital narratives	Identity construction	**Meaning**
"Gamified interfaces … drive users through levels and personalized interfaces and tasks strengthen users' competences"	Gamification	Skill development	**Accomplishment**

“A good case … is the gaming at the Egyptian Museum in Turin”	Playful learning	Competence via play	**Accomplishment**

Appendix C: List of Analyzed TDCEs

Name	Content	Device / technology	Developement stage	Scale	Country
Arcadia Earth	Immersive multisensory exhibition on sustainability and climate change	AR/VR, projection mapping, LED walls, sound, interactive installations	Well established	Large	USA
Ars Electronica	Interactive / immersive media art, R&D installations, projection-based immersive environments, data visualisations, robotics, mixed reality etc.	Projection mapping (large walls/floors), 3D visualization, interactive tracking, mixed/augmented/virtual reality, robotics, AI, media architecture	Fully developed	Large	Austria
Artivive App	Augmented reality tool that overlays digital layers over physical artwork; used by artists and museums to animate, annotate, enrich works of art through AR, offering WebAR/app AR services	Smartphone / tablet apps + WebAR; AR overlay, marker-based AR, digital image recognition etc.	Fully developed	Medium to large	Austria

ArtMingle Platform	Platform offering holographic virtual galleries enriched with curated content and guest artist appearances	Holographic technology, online platform, interactive content	Experimental	Medium	All - Global
ArtVerse App	Aggregates AR experiences from cultural institutions; offers multimedia guide with AR content, interaction with artworks and artifacts; enhances museum visits via AR	Augmented Reality via smartphone/tablet apps; AR multimedia guide; interactive AR overlay	Fully developed	Medium	All - Global
British Museum's Museum of the Future	Digital / conceptual strategy exploring how museums might evolve (including how to use digital, public dialogue, digital displays, exhibitions of future scenarios)	Uses mixed media: video, digital displays, exhibitions, possibly AR/VR / interactive content (depending on component); strong focus on public engagement and exhibiting future themes	In development	Large	UK
British Museum's RTI	Imaging technique used to capture fine surface detail (texture, relief, material	RTI dome, photographic rig setups; multi-light imaging, high resolution photography; lighting from different	Well established	Medium to large	UK

	features) on artifacts; scientific / conservation / documentation use	angles; viewer software for relighting/viewing			
Carne Y Arena	Immersive VR installation using sensory elements (cold rooms, sand, wind , sound, visuals) to recreate the perilous journey of migrants crossing the U.S.–Mexico border	VR -immersive	Well established	Small	USA / Mexico
Pompidou Museum Playing Pompidou	Facade transformed into a musical instrument, composing music from raw sounds recorded inside the museum.	AR lens accessible both on-site and remotely (snapshat)	Experimental	Small	France
CultureerBewust	Collaborative platform creating accessible and inspiring content	Website	Well established	Small	Netherlands
Daily art App	Presents one artwork per day with short story; includes a large catalog of artworks, artists, museums; thematic collections and city guides	Smartphone / tablet app (iOS, Android), notifications, search/browse UI, widgets etc.	Well established	Large	All - Global

Fondazione Prada's Calculating, Empires	Exhibition / visual narrative mapping how empires of past and technology companies today echo each other; using drawings, texts, maps; exploring themes of communication, computation, control, classification etc.	Physical exhibition space + visual media; large format maps, installations, audio, possibly video / projection; research-art hybrid media design	Fully developed	Medium to large	Italy
Fondazione Vodafone Italia's LV8	Mobile learning game aimed at young NEETs (Not in Education, Employment or Training) to develop basic digital skills via gamification; includes quizzes, short games, certifications (Open Badges), used in schools/projects	App (iOS, Android), online platform; gamified learning modules; uses UI/UX designed for engagement, possibly accessible design (EasyReading font) etc.	Fully developed	Medium	Italy
Google arts & Culture	Digital platform offering immersive, interactive access to global cultural and artistic heritage.	HD digitization, 3D/Street View, advanced image processing, AR/VR, AI-driven curation, online exhibition tools	Well established	Large	All - Global

Hermitage Museum's NFT Project	okens / digital copies of masterpieces; virtual exhibitions (e.g. *The Ethereal Aether*) showcasing digital art and NFTs; experiment in using NFTs to engage public / collectors	Blockchain / NFTs; virtual exhibition environments; PC, smartphone, possibly VR for virtual exhibitions	Experimental	Medium to large	Russia
Indian Engineering College's TechArt Quest	Student project blending cultural content and technology; participants create AI-generated art and interactive installations, supported by an online community	AR/VR, AI art generation, gamification, online collaborative platform	Experimental	Small to medium	India
Kunstmatrix Platform	Platform for artists/galleries to create virtual exhibitions and 3D online galleries; lets curators build online 3D exhibition spaces, display artworks, videos, audio, etc.	Web platform, 3D visualization, virtual gallery spaces, AR for previewing art in real-spaces	Fully developed	Medium to large	Germany
MetaMosque Project	Virtual Reality & immersive tours of iconic mosques; educational tours of Hajj &	Available on Android, iPhone, PC, MetaQuest VR; uses immersive VR, app interfaces	Fully developed	Large	All - Global

	Umrah; aims to offer communal/spiritual experience in virtual world				
Metaverse Seoul Project	Municipal metaverse platform offering citizens access to services (tax filing, education, consultation, public offices), plus cultural/entertainment spaces	Virtual platform accessible via web and mobile app; avatars; AR/VR environments	Fully developed	Large	South Korea
Milan Municipality's AI Dataportal_Arch of Light	Public art project turning the Arco della Pace into a 360° "data sculpture" with AI-generated light projections; linked to an NFT to mark the first monument entering the Metaverse	Projection mapping, AI-generated imagery, immersive light installation, NFT/blockchain extension	Fully developed	Large	Italy
MIT's AI Painter	AI system for reproducing/restoring paintings (e.g. "RePaint" project and AI restoration masks)	Machine learning, 3D printing, imaging, polymer masks	Experimental	Medium	USA

Mizuma Railway Company's Digital art Train	A train ride with projection-mapped digital art displayed on train exterior during a festival; patterns change along the route as part of a light art event	Multiple projectors mounted on a two-car train; projection mapping on train surfaces; possibly spot lighting; smartphone photography by passengers	Fully developed	Small to medium	Japan
Musée d'Orsay-Hello Vincent app	Interactive storytelling exploring Van Gogh's life and works.	Mobile app, AR, interactive animations, multimedia content (images, audio, text).	Well established	Small	France
Museum of the Future of Dubai	Immersive, multi-floor museum exploring near-future technologies, innovation, ecology, wellness, space, and the human condition; engages all senses with experiential storytelling and exhibits	Interactive/immersive exhibits including projection walls and domes, VR/AR, mixed reality, sensor-based installations; app 'Navigator' for personalized, location-aware interactive experience; digital signage; multi-	Fully developed	Large	UAE

		media audio-visual technologies; haptic / multi-sensory elements			
National Archeological Museum of Naples' Father and Son	A narrative/adventure mobile video-game that lets the player travel through different historical periods using artworks and museum collection, intertwining personal story and heritage (modern-day Naples, Pompeii, Egypt, etc.)	Mobile game (iOS, Android), developed in Unity; 2D side-scrolling with hand-drawn graphics; multi-language; some geo-location features for unlockables in-museum	Fully developed	Medium to large	Italy
Salvador Dali Museum's Dali Lives	AI-based interactive exhibit that lets visitors interact with a life-like version of Salvador Dalí, exploring his life via screens throughout the museum; includes related AR/VR experiences like "Dreams of Dalí", mobile guide etc.	AI / machine learning, interactive screens, augmented reality, virtual reality, mobile apps (guide + AR overlays)	Fully developed	Medium to large	USA
Shibuya platform	Streaming + short film / pilot-series stories where fans can view, vote or even help fund	Web + mobile streaming; digital video content; interactive / user	Fully developed	Medium to large	All- Global

	which pilots become full series; blends content creation & fan voting / crowdfunding	voting / crowdfunding mechanisms; possibly AR/VR, though core is video & streaming			
Sketch Academy	Online courses & resources for sketchnoting, visual journaling (analog + digital); helps people learn to capture ideas visually and creatively	Web platform, video/text/image lessons, PDF workbooks; digital tools (drawing apps, etc.)	Fully developed	Medium	All- Global
Socios.com	Platform for fan engagement & rewards using “Fan Tokens” to give fans voting rights, access to exclusive content, merchandise, events, etc.	Mobile + web app; blockchain / crypto tokens (Chiliz blockchain); staking, wallet; voting & reward-mechanisms in-app	Fully developed	Large	All- Global
Syndey Signal Box Public Art Project	Decorating / wrapping traffic/signal boxes in inner-city Sydney with artworks by local artists (vinyl wraps); aim to beautify, reduce graffiti, enhance public space	Vinyl prints (digital artwork printed on vinyl), applied as wraps over signal/traffic signal boxes; basic installation devices	Fully developed	Medium	Australia

TeamLab's immersive exhibitions	body-immersive installations merging art, technology, science, and nature, where visitors explore and co-create evolving landscapes.	digital projections, light, sound, and interactive design	Well established	Large	Japan
The Step-Futurability District	Interactive, immersive space exploring "the future" via STEAM, workshops, experiences that react/adjust in real time; app to guide the user and continue engagement post-visit	App (mobile), augmented reality / immersive tech, data-visualization, interactive installations, projection, digital media	Well established	Medium to large	Italy
ZKM Zentrum für Kunst und Medien	Institution combining art, media, and technology; exhibitions, archives, research and production in digital/media arts	Interactive installations, VR/AR, projection, sound labs, robotics, AI, preservation tools for media art	Well established	Large	Germany