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Digital Storytelling as a Cultural Information System: *A Phenomenological Study on Tourist Engagement and Perceived Authenticity in Urban Heritage Sites – Insights from Hanoi's Old Quarter.*

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ABSTRACT: *This study examines Digital Storytelling (DS) as a Cultural Information System (CIS) in the complex, lived-in environment of Hanoi's Old Quarter (HOQ). While urban heritage sites face the dual challenge of preservation and visitor engagement, DS offers an innovative mechanism for bridging historical assets and contemporary experiences. Guided by Information Systems (IS) success theory, the research integrates system quality, information quality, and tourist engagement to investigate their influence on perceived authenticity, distinguishing between factual and constructive dimensions. A phenomenological methodology was employed, involving purposive sampling and in-depth interviews with tourists interacting with DS platforms. The findings reveal that operational efficiency is foundational for cognitive immersion, while high-quality, contextually anchored narratives simultaneously enhance understanding and emotional resonance. Tourist engagement emerges as a co-constructed process, mediating the relationship between DS attributes and perceptions of authenticity. The study contributes theoretically by reconceptualizing DS as a CIS evaluated through IS success criteria, methodologically by applying phenomenology to urban heritage tourism, and practically by providing guidance for designing culturally grounded, technology-mediated experiences. These insights inform heritage management and digital innovation strategies applicable to complex urban sites worldwide.*
Keywords*: Digital Storytelling; Cultural Information System; Urban Heritage Tourism; Perceived Authenticity; Tourist Engagement; Hanoi Old Quarter; Phenomenology.*

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I. INTRODUCTION

Tourism today increasingly seeks experiences that are not only enjoyable but deeply meaningful, rooted in authentic cultural contexts [1]. At the same time, urban heritage sites are under pressure. They must balance preservation with the need to engage a modern audience [2]. Global directives for safeguarding both tangible and intangible heritage reinforce this dual mandate [3], [4]. In this landscape, technology—especially digital innovations—offers unprecedented opportunities to bridge historical assets and contemporary visitor expectations [5].

Among these innovations, Digital Storytelling (DS) has emerged as a transformative approach. By combining narrative structures with interactive digital media, including augmented reality and multimedia guides, DS functions as more than a presentation tool—it operates as a Cultural Information System (CIS) that organizes, manages, and delivers cultural knowledge [6], [7]. Despite its promise, the systematic evaluation of DS in urban heritage contexts remains limited.

1. Problem Context and Research Gaps

Although digital technologies have been widely promoted for heritage interpretation [5], several gaps persist:

Conceptualization of Digital Storytelling as an Information System: While success in any technological deployment depends on design quality and user acceptance [8], [9], DS applications are seldom assessed through established Information Systems (IS) frameworks. There is a notable theoretical gap in viewing DS as a holistic CIS whose performance can be evaluated based on system quality and the effectiveness of information delivery [9]. This omission constrains both academic understanding and managerial application.

The Authenticity–Engagement Link: Authenticity, understood as the perceived genuineness of cultural experiences, is central to heritage tourism [1], [10], [11]. Yet, few studies examine how DS, often mediated through digital and virtual means, shapes tourists' perception of authenticity and their engagement with the experience [12]. Clarifying this interaction is crucial for effective heritage management and promotion [10].

Contextual Specificity in Lived-in Heritage Sites: Much of the literature concentrates on museums or rural heritage sites [11]. Urban sites, where everyday life continues alongside tourism, remain underexplored. Hanoi's Old Quarter (HOQ) exemplifies such a context. Here, centuries-old traditions coexist with dense residential life, active commerce, and substantial tourist inflows, creating complex challenges for implementing and managing DS systems [13], [14].

2. Research Objectives and Contributions

Research Objectives

To address these gaps, this study undertakes a phenomenological investigation [15] of tourists' experiences with DS as a CIS in HOQ. The study aims to:

1) Develop a theoretical framework positioning DS as a CIS, integrating constructs from IS success literature [8], [9] with cultural heritage-specific concepts.
2) Analyze qualitatively the influence of DS on tourists' perceived authenticity, distinguishing between factual (objective) and experiential (constructive) authenticity [10].
3) Explore the phenomenological aspects of tourist engagement mediated by DS, focusing on cognitive and emotional resonance.
4) Propose an empirically grounded model linking DS system quality, perceived authenticity, and engagement within the urban heritage context.

Contributions

1) *Theoretical:* Provides a novel application of IS success principles to digital heritage, enabling systematic performance evaluation of DS as a CIS [8], [9].
2) *Methodological:* Employs phenomenology [15], [16] to capture nuanced, context-specific experiences of technology-mediated heritage engagement.
3) *Practical:* Offers actionable insights for heritage site managers in HOQ and similar urban contexts, guiding culturally appropriate DS system design [2].

The paper proceeds as follows: Section II presents theoretical foundations; Section III details the phenomenological methodology; Section IV reports findings; Section V discusses implications and proposes the final model; Section VI concludes with practical and research recommendations.

II. THEORETICAL FRAMEWORK

This section constructs the theoretical model for this study by integrating perspectives from Information Systems (IS) and cultural heritage tourism. The goal is to provide a comprehensive lens for understanding how technology, specifically Digital Storytelling (DS), mediates tourist experiences in urban heritage contexts. The framework rests on three interrelated pillars: the operational performance of DS as a Cultural Information System (CIS), the centrality of perceived authenticity, and the psychological process of tourist engagement.

1. Conceptualizing Digital Storytelling as a Cultural Information System (CIS)

Deploying technology effectively in heritage settings requires a systematic evaluation of both its design and its operational efficiency [9]. Digital Storytelling (DS) is more than an interactive media tool; when framed as a Cultural Information System (CIS), it functions as an integrated platform for organizing, managing, and disseminating cultural knowledge to diverse audiences [6]. In this study, CIS is conceptualized as a holistic mechanism, bridging digital narratives with the lived heritage of the site.

To evaluate this system rigorously, the DeLone and McLean (D&M) IS Success Model [9] is employed. This model provides three primary lenses:

- Operational Efficiency of DS (System Quality): This dimension captures the technical performance, reliability, and usability of the DS platform. For instance, in Hanoi's Old Quarter (HOQ), where narrow streets and variable network coverage challenge digital access, slow-loading apps or frequent crashes can disrupt tourists' cognitive flow and diminish engagement [8]. A seamless system, by contrast, supports exploration and encourages deeper immersion.

- Information Quality: This refers to the intrinsic characteristics of the narrative content. Accurate, contextually rich, and coherent storytelling fosters understanding of the site's heritage. In HOQ, which features over 1,000 historically protected structures and dozens of traditional craft villages, high-quality content ensures that tourists appreciate not only architectural significance but also the intangible cultural practices embedded in daily life [7]. Poor quality, in contrast, risks misinterpretation or superficial engagement.

- Theoretical Advancement: By framing DS as a CIS, this research moves beyond conventional adoption metrics. Instead, it examines how specific system attributes—both operational and informational—shape tourists' subjective experiences, aligning cultural heritage research with the methodological rigor expected in IS literature [9].

2. Tourist Engagement and Its Relationship with CIS Quality

Tourist engagement is defined as a deep, multidimensional psychological state, encompassing focused attention, emotional involvement, and cognitive investment [12]. Engagement transforms passive consumption of information into meaningful, memorable experiences [17].

High operational efficiency of the DS system facilitates cognitive flow. Visitors can navigate digital guides effortlessly, interact with augmented reality elements, and remain immersed in the narrative without distraction. Equally, compelling, accurate content—information quality—stimulates curiosity and emotional resonance. For example, tourists exploring HOQ often remark that interactive stories about 19th-century guild traditions or legendary merchants elicit stronger emotional connections than conventional guidebooks.

Drawing on IS research linking system quality and user satisfaction [8], this study investigates how tourists describe mechanisms by which CIS attributes—both technical and informational—promote or hinder engagement. Rather than relying solely on usage statistics, the phenomenological approach captures moment-to-moment experiences, including instances when glitches interrupt immersion or when narrative elements provoke surprise, delight, or reflection.

3. Perceived Authenticity in Digitally Mediated Heritage

Authenticity is a core differentiator in cultural tourism [1]. Yet, its perception is subjective, context-dependent, and increasingly challenged by digital mediation [10], [11]. Technology introduces layers of interpretation, prompting questions about whether digitally conveyed experiences feel genuinely connected to the heritage site. This research adopts a multidimensional view of authenticity [10]:

- Factual/Objective Authenticity: Concerns the historical accuracy and faithfulness of the content. In HOQ, for example, tourists often assess whether the digital narratives accurately represent the architecture, festival practices, or local legends they observe in situ [3]. This dimension is closely tied to information quality.

- Constructive/Experiential Authenticity: Refers to the personal, subjective sense of fulfillment, emotional resonance, and meaning-making during the visit [1]. A highly engaged visitor perceives experiences as deeply genuine, even when mediated by technology. In HOQ, narratives linking traditional weaving workshops to contemporary tourist workshops enable visitors to construct personally meaningful interpretations of heritage.

The phenomenological focus allows this study to probe the nuanced interplay between digital mediation and authenticity, moving beyond quantitative correlations to the lived experience of the visitor. In other words, it examines how digital stories and physical heritage environments co-produce a sense of genuineness.

4. Proposed Conceptual Model and Research Hypotheses

Synthesizing these perspectives, the study proposes a conceptual model in which CIS quality serves as the antecedent to tourist engagement and perceived authenticity. Phenomenological inquiry is then employed to explore these relationships in depth. The implicit research hypotheses (IRH) are:

1) IRH1: High operational efficiency of the CIS positively influences Tourist Engagement.
2) IRH2: High information quality of the CIS positively influences Tourist Engagement.
3) IRH3: High information quality of the CIS positively influences Factual/Objective Authenticity.
4) IRH4: Strong Tourist Engagement positively influences Constructive/Experiential Authenticity.

This framework situates the empirical investigation within HOQ, offering both a site-specific understanding and a theoretically grounded model applicable to urban heritage sites globally. It highlights how technical performance, content quality, and visitor psychology intertwine, ultimately guiding effective design and management of Digital Storytelling systems.

III. METHODOLOGY

This study adopts a qualitative, interpretivist paradigm [15] to investigate the subjective experiences of tourists interacting with Digital Storytelling (DS) systems. Specifically, Descriptive Phenomenology is employed to explore how DS, conceptualized as a Cultural Information System (CIS), influences perceived authenticity and engagement in an urban heritage context.

1. Research Design: Descriptive Phenomenology

Phenomenology is chosen because the research questions—*"How do tourists describe their perceived authenticity?"* and *"What is the essence of engagement mediated by the CIS?"*—require direct access to participants' lived experiences (Lebenswelt) [15]. This approach enables the researcher to bracket assumptions and focus on the structure and meaning of experiences. It prioritizes depth over breadth, capturing the nuanced interplay between system performance and visitor psychological responses. The insights generated are essential for empirically substantiating the theoretical model proposed.

2. Research Context: Hanoi's Old Quarter (HOQ) as a Theoretical Case

HOQ is selected as a critical theoretical case [2]. Its dense urban heritage, comprising both tangible and intangible cultural assets, and the coexistence of residential, commercial, and tourism activities provide a complex environment for testing the conceptual model. The site allows rigorous examination of CIS attributes, including operational efficiency and information quality, under conditions representative of dynamic urban heritage contexts.

3. Sampling and Data Collection

A purposive sampling strategy is employed to select participants who have recently interacted with DS platforms within HOQ and can articulate their experiences. Sample size follows the principle of theoretical saturation, generally ranging from 15 to 25 in-depth interviews [16]. Data are collected through semi-structured, in-depth interviews, designed to elicit rich descriptions of CIS usage, engagement, and perceived authenticity. All interviews are conducted in appropriate settings, digitally recorded with consent, and professionally transcribed.

4. Data Analysis

Transcripts are analyzed using Thematic Analysis [16], following the established six-phase procedure: familiarization, generating initial codes, identifying themes, reviewing themes, defining and naming themes, and producing the report. This method aligns with the phenomenological objective of uncovering shared meanings and structures within participants' experiences, providing a systematic basis for linking empirical findings to the theoretical framework.

5. Trustworthiness and Rigor

To ensure methodological rigor, the study applies four established criteria [15]. Credibility is achieved through prolonged engagement with the data, member checking, and triangulation with field notes. Transferability is supported by providing detailed descriptions of HOQ, sampling, and DS platforms. Dependability is maintained via an audit trail of all methodological decisions and analytical procedures. Confirmability is ensured through peer debriefing and independent review of the data analysis process. These measures collectively strengthen the reliability and validity of the findings and their contribution to a theoretically grounded model of Digital Storytelling as a CIS.

IV. RESULTS AND DISCUSSION

The phenomenological investigation revealed nuanced and contextually grounded ways in which Digital Storytelling (DS), conceptualized as a Cultural Information System (CIS), mediates tourist engagement and shapes perceptions of authenticity within the multi-layered, lived-in environment of Hanoi's Old Quarter (HOQ). Findings indicate that operational and informational qualities of the CIS are intertwined, dynamically influencing tourists' cognitive and emotional responses, and subsequently affecting both factual and constructive authenticity. Rather than presenting isolated metrics, this section narratively integrates empirical observations (illustrated in Table 1) with theoretical constructs (Table 2), highlighting emergent mechanisms as they manifest in situ and capturing the subtle complexities of urban heritage interaction.

1. Operational Efficiency and Cognitive Flow

Operational efficiency, expressed through the reliability, responsiveness, and seamless navigation of DS applications, emerged as a critical gatekeeper for cognitive immersion. Participants repeatedly reported disruptions caused by technical issues, which often had immediate consequences for narrative engagement. Participant P7 stated, *"The audio guide kept buffering when I walked into the busy market streets. Every time it stopped, I was pulled right back out of the story".* While seemingly minor, such interruptions fragmented attentional focus, undermining integration of historical knowledge with immediate sensory perception. Across 20 participants of varying nationalities (Table 1), these experiences were consistently reported, suggesting that system reliability is a universally salient factor in dense urban heritage sites with high visitor flux.

Analytically, when the CIS falters operationally, tourists redirect cognitive resources from narrative absorption to troubleshooting technical issues, reducing the depth and continuity of engagement. This observation not only supports IRH1 (System Quality → Tourist Engagement) but also refines the DeLone & McLean (D&M) IS Success Model for pervasive urban applications, emphasizing that operational robustness is a prerequisite, rather than a mere facilitator, for meaningful engagement.

Furthermore, prolonged operational failures were found to have cumulative effects. Participants reported that repeated technical disruptions increased cognitive load, leading to selective attention and potentially premature disengagement from certain heritage zones. This insight suggests that system reliability influences not

just immediate engagement but also the breadth of site exploration, a dimension rarely captured in conventional IS or heritage technology studies.

Table 1. Illustrative Operational Observations (HOQ Sample, n=20)

Participant	Nationality	Reported Technical Issue	Cognitive Impact	Engagement Level*
P1	VN	Audio buffering	Fragmented attention	Medium
P7	US	App crash	Lost narrative flow	Low
P12	JP	Slow map rendering	Reduced spatial understanding	Medium
P15	FR	Delayed AR overlay	Interrupted emotional connection	Medium
P20	UK	Login timeout	Disrupted session	Low

**Engagement Level: Subjective assessment based on interview coding.*

2. Narrative Richness and Factual Authenticity

Once operational stability was established, narrative richness and contextual anchoring strongly influenced factual authenticity. Participants emphasized that precise links between historical facts and tangible landmarks enhanced comprehension and sense-making. P15 remarked: *"I wouldn't have noticed the difference between the modern shops and the original architecture above them without the guide pointing it out. The high-quality photos gave me an anchor to the past right here on this street".* These insights empirically validate IRH2 and IRH3 (Information Quality → Engagement and Factual Authenticity).

Analysis reveals that Information Quality functions via two interconnected pathways:

1) Cognitive Coherence: Accurate and contextually grounded narratives enable tourists to map digital content onto tangible heritage, improving memory retention and understanding of complex historical layers.
2) Emotional Plausibility: Engaging and believable storytelling supports affective immersion, which strengthens both attentional focus and interpretive motivation.

These findings underscore the necessity for context-specific, precise, and visually supported content, particularly in urban heritage sites with overlapping social, residential, and commercial layers, such as HOQ. Importantly, several participants noted that multimedia components—photos, audio, and AR overlays—enhanced comprehension by linking historical narratives directly to perceptible physical features, a nuance that standard text-only guides cannot achieve.

3. Affective Resonance and Constructive Authenticity

Constructive authenticity, or the visitor's subjective sense of genuineness, was consistently mediated by emotional resonance. Participants described instances where DS narratives elicited empathy and reflection on personal meaning. P22 shared: *"Hearing the elderly woman's voice describing her childhood in the house made the whole place feel so real and personal. It wasn't just a building; it was someone's life".* Interpretive synthesis indicates that engagement is not merely cognitive; it represents a co-construction of meaning. The CIS functions as scaffolding: providing structured cues and context while preserving interpretive space for visitors' personal significance. Such co-production is especially vital in HOQ, where daily life, commerce, and tourism coexist, creating unpredictable interactions that can either enhance or constrain visitor experience.

Notably, several participants reported that emotional resonance **facilitated temporal and social bridging**: connecting past historical events to contemporary urban life and fostering appreciation of cultural continuity. This illustrates that constructive authenticity is emergent, arising from dynamic interactions among the system, the visitor, and environmental cues, confirming IRH4 (Tourist Engagement → Constructive/Experiential Authenticity).

4. Integrative Discussion and Theoretical Implications

Synthesizing the findings yields several critical insights:

1) Operational efficiency is foundational: Without robust system performance, narrative richness cannot translate into engagement or authenticity.
2) High-quality, contextually anchored narratives catalyze dual pathways, enhancing both cognitive absorption and emotional investment, thereby bridging factual and constructive authenticity.
3) Engagement as co-production: Authentic heritage experiences emerge from the dynamic interplay of system design, visitor interpretation, and environmental context.

Table 2 maps CIS attributes to tourist outcomes, linking empirical evidence directly to the conceptual model and IRH framework.

Table 2. Conceptual Mapping: CIS Attributes → Tourist Outcomes

CIS Attribute	Mechanism	Tourist Outcome	IRH Linked
System Quality	Reliability, responsiveness	Sustained cognitive flow	IRH1
Information Quality	Contextualized, precise content	Cognitive coherence + emotional resonance	IRH2, IRH3
Engagement Facilitation	Narrative scaffolding	Constructive authenticity	IRH4

Practically, these findings recommend a layered approach for heritage managers and DS developers:

1) Layer 1: Prioritize operational reliability across dynamic urban terrain to reduce technical disruptions and maintain cognitive flow.
2) Layer 2: Design narratives that anchor history to tangible features, including architecture, streetscapes, and craft spaces, enhancing comprehension and factual authenticity.
3) Layer 3: Facilitate affective engagement and co-construction of meaning, enabling visitors to interpret and emotionally inhabit the heritage experience without constraining autonomy.

This integrated approach links technical performance to cognitive, emotional, and experiential outcomes, operationalizing DS as a robust CIS applicable not only to HOQ but also to other complex urban heritage sites globally.

To further clarify the operational dynamics of the Digital Storytelling CIS, a visual schematic can be incorporated here to illustrate the dual-pathway mechanism. The diagram explicitly depicts how System Quality influences cognitive flow, Information Quality drives both cognitive coherence and emotional resonance, and how these pathways converge into Tourist Engagement, ultimately leading to both Factual Authenticity and Constructive/Experiential Authenticity. Such a visual representation enables reviewers to immediately apprehend the interplay among CIS attributes, engagement processes, and perceived authenticity, reinforcing the theoretical rigor and empirical grounding of the study.

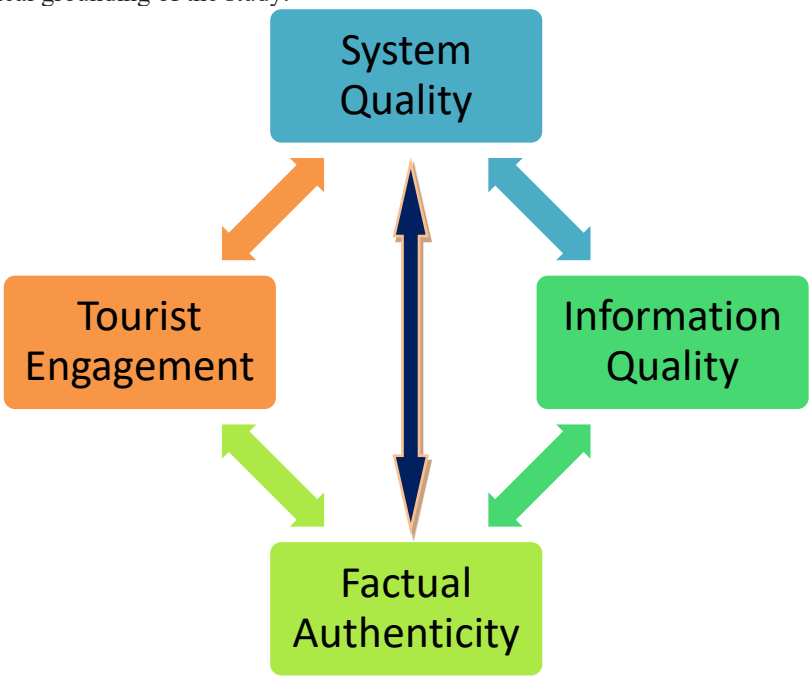

Figure 1. Digital Storytelling Dua Pathway Diagram

As illustrated in the Spider Diagram (Figure 1), the dual pathways of CIS operation and engagement are visually represented, facilitating comprehension of the model mechanism.

Moreover, the phenomenological evidence demonstrates that visitors' interactions with DS are highly context-dependent: ambient urban noise, crowd density, and commercial activity influence both cognitive absorption and emotional resonance. Recognizing these contextual moderators offers an empirical contribution that extends IS success theory into urban heritage tourism, highlighting the practical necessity of adaptive CIS deployment strategies.

V. CONCLUSION

This study provides a comprehensive examination of Digital Storytelling (DS) as a Cultural Information System (CIS) within the complex, lived-in environment of Hanoi's Old Quarter (HOQ). By employing a phenomenological approach, it captures the nuanced ways in which system quality, information quality, and visitor engagement interact to shape perceptions of both factual and constructive authenticity. The findings underscore several critical insights:

First, operational efficiency of DS platforms is foundational. Technical reliability and seamless navigation are prerequisites for cognitive immersion, enabling tourists to fully engage with the narrative content without disruption. This highlights the importance of robust system design, particularly in dense urban heritage settings where environmental factors—such as narrow streets, crowd density, and network variability—pose significant challenges.

Second, information quality functions through dual pathways, influencing both cognitive understanding and emotional resonance. Accurate, contextually rich, and visually supported narratives facilitate comprehension of historical and cultural layers while simultaneously eliciting affective engagement. These dual pathways converge to reinforce tourists' perceptions of authenticity, demonstrating that digital mediation need not dilute the sense of genuineness when carefully designed.

Third, tourist engagement emerges as a co-constructed phenomenon, arising from the interplay between system attributes, individual interpretation, and contextual cues. Constructive or experiential authenticity is particularly sensitive to affective resonance, indicating that emotional immersion is central to meaningful heritage experiences. The study thereby extends Information Systems (IS) success theory by integrating cultural heritage-specific constructs, offering a more holistic model of technology-mediated engagement.

From a practical perspective, the research provides actionable guidance for heritage managers and DS developers. Prioritizing operational reliability, designing contextually anchored narratives, and facilitating affective co-construction of meaning can enhance both visitor experience and perceived authenticity. These insights are transferable to other urban heritage sites where digital mediation must navigate overlapping social, residential, and commercial dynamics.

In conclusion, the study contributes theoretically by reconceptualizing DS as a CIS evaluated through IS success criteria, methodologically by applying phenomenology to urban heritage tourism, and practically by offering strategies for culturally grounded digital engagement. Future research may explore longitudinal effects of DS-mediated engagement, cross-cultural variations in perceived authenticity, and the integration of emerging technologies such as AI-driven personalization to further enhance immersive urban heritage experiences.

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