

# Logical Mechanism and Path Selection for the Innovative Transformation of Hengyang's Revolutionary Cultural Resources Empowered by Digital Technology

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## Abstract

Digital technology-enabled innovation in red cultural resources has become a critical pathway for the sustainable transmission and development of red cultural heritage. In Hengyang, however, the digital transformation of red cultural resources remains constrained by structural factors, including inadequate top-level design, lagging infrastructure, insufficient technological depth, and a shortage of professional talent. Addressing these constraints requires improving policy frameworks and coordinated planning, accelerating new infrastructure and red resource database development, strengthening talent cultivation and recruitment mechanisms, advancing immersive and context-aware applications, and building a diversified communication matrix and distinctive red cultural brands. These measures can facilitate a stepwise upgrading of Hengyang's red cultural resources from static preservation through digital revitalization to value creation.

## Keywords

Digital Technology Empowerment; Red Cultural Resources; Innovative Transformation; Logic and Mechanism

## 1. Introduction

General Secretary Xi Jinping pointed out: "We must make good use of red resources, carry forward red traditions, and pass on red genes. (Sun Hong, 2026)" Red cultural resources are the material legacies and spiritual identifiers accumulated by the Communist Party of China in uniting and leading the Chinese people through the processes of revolution, construction, and reform. They embody the collective memory of the great rejuvenation of the Chinese nation and constitute vital resource foundations for patriotic education in the new era. As digital technologies become deeply integrated into social and production activities, leveraging these technologies

to enable the creative transformation and innovative development of red cultural resources represents not only a key practical pathway to perpetuating the red legacy but also a major theoretical imperative in the field of cultural heritage protection that urgently requires attention. Next-generation digital technologies—such as 5G, big data, artificial intelligence, virtual reality (VR), and blockchain—are profoundly reshaping the logic of collecting, storing, displaying, disseminating, and reproducing red cultural resources. At the policy level, from the Ministry of Culture and Tourism's 2020 initiative to "promote the digitalization of outstanding cultural resources," to the "Opinions on Implementing the Revolutionary Cultural Relics Protection and Utilization Project (2018–2022)" which called for establishing a red resource database, to the "Hunan Province Archives Regulations" effective in 2026, which include dedicated provisions on red archives, and finally to the national "14th Five-Year Plan" outline's deployment of "implementing a digitalization strategy for the cultural industry," institutional support has been continuously strengthened. This provides robust policy backing for leveraging digital technologies to facilitate the innovative transformation of red cultural resources (Gao Yifan, 2025).

Hengyang is not only a nationally designated historical and cultural city but also a region abundant in red cultural resources. The city currently hosts over 300 revolutionary cultural relics and historical sites, including two national-level patriotic education demonstration bases, six provincial-level ones, 37 municipal-level ones, and 55 county-level ones. Key red cultural landmarks—such as the Xiangnan Students' Federation Memorial Hall, the former residence of Xia Minghan, the Shuikou Mountain Workers' Movement Memorial Hall, the former residence and memorial hall of Luo Ronghuan, and the Hengyang Defense War Memorial Hall—collectively delineate the complete historical trajectory of the New Democratic Revolution. Together, they constitute a richly diverse and temporally and spatially coherent red cultural resource zone, providing a representative case study for exploring how digital technologies can empower the transformation of red cultural resources. Existing research has primarily followed three lines of inquiry: functional value (Jin Qingmei et al., 2023), scenario-based applications (Wang Yi et al., 2026), and potential risks (Wu Keyu et al., 2026). Overall, this field remains in its nascent stages; theoretical frameworks are yet to be fully established, specialized research on the digitalization of red cultural resources within specific regional contexts remains scarce, and the underlying mechanisms driving the digital transformation of local red cultural resources urgently require elucidation.

## **2. The Logical Mechanism of Digital Empowerment for the Innovative Transformation of Hengyang's Red Cultural Resources**

The comprehensive empowerment of Hengyang's red cultural resources through

digital technologies fundamentally stems from the deep integration and synergistic coexistence of these technologies with red cultural resources. At its core lies the full utilization of the comparative advantages of digital technologies—such as big data, artificial intelligence, cloud computing, and virtual reality—in terms of processing efficiency, precision, and coverage scope, thereby ensuring that these technologies are fully embedded across all key elements and critical stages of the innovation and transformation of red cultural resources. Drawing upon existing theoretical frameworks on how digital technologies can empower the high-quality development of cultural industries (Zhao Ting et al., 2026), and integrating local practices in the digitalization of red cultural resources in Hengyang, this study delineates the key stages of this empowerment process into four progressively structured logical tiers.

### **2.1. The foundational tier: Empowering the "Digital Transformation" of Hengyang's Red Cultural Resources Through Digital Processing Technologies**

This phase establishes the material foundation and data prerequisite for subsequent technological empowerment stages; its core objectives can be summarized as "preserving authenticity and ensuring long-term retention" and "ensuring scientific organization."

Digital Acquisition and Processing. Systematically cataloging and investigating the quantity, spatial distribution, existing forms, and current preservation status of Hengyang's red cultural resources constitutes the fundamental prerequisite for scientifically constructing a red cultural resources database. From the perspective of resource typology, Hengyang's red cultural resources can be categorized into four types: documentary and archival resources—comprising revolutionary documents, letters, diaries, newspapers, and periodicals; site and relic resources—including former residences, former sites, cemeteries, and battlefield ruins; movable cultural relics—such as weapons, insignia, and daily utensils; and spiritual and cultural resources—encompassing revolutionary narratives, folk songs, and ideological lineages. For each category of resource, appropriate digital acquisition techniques should be employed: for red documentary resources, techniques such as digital photography and OCR (Optical Character Recognition) can be used to extract text and capture images, followed by standardized encoding and archiving; for physical resources—including revolutionary artifacts, former sites, and buildings—technologies such as the Global Positioning System (GPS), 3D laser scanning, and aerial photogrammetry can be utilized to acquire three-dimensional spatial data and color/texture information, thereby constructing high-precision digital models. In 2023, Hengyang Daily transferred all historical pages from its founding in 1949 to 1973 to the Hengyang Municipal Archives. The Hengyang Municipal Archives subsequently carried out systematic restoration of these materials and progressively advanced their digitalization process; to date, the scanning and archiving of the first batch—comprising over 50,000 pages—has been

completed (Qin Wei, 2023). For living cultural resources, such as red-themed music, dance, and drama, dynamic, three-dimensional, and high-definition digital recordings can be achieved using technologies including 2D/3D digital animation and holographic imaging. For intangible cultural resources—such as red-themed narratives, the red spirit, and red figures—oral history research methods may be employed, combined with existing historical documents, to conduct systematic textual collection and dynamic documentation.

**Virtual Restoration and Reproduction.** Digital restoration technologies provide pathways for restoring and reproducing red cultural resources in Hengyang that have been partially damaged or completely lost, thereby offering irreplaceable application value in the field of cultural heritage conservation. For documentary resources such as red historical documents, computer technologies can be integrated with artificial intelligence and image processing software to accomplish image restoration and textual reconstruction (Zhang Hao, 2024); for instance, intelligent restoration has been applied to damaged pages of historical documents related to the workers' movement at Shuikou Mountain. For tangible cultural resources, such as red historical sites and red buildings, technologies like laser 3D scanning and CT scanning can be employed to acquire images and data, which are then leveraged alongside virtual reality (VR) technology to establish 3D model databases, enabling the digital reconstruction of damaged structures. For intangible cultural resources, including red spirit and red figures, technologies such as VR, augmented reality (AR), and holographic projection can be utilized to perform digital restoration and scene reconstruction of relevant texts, images, and audio-visual materials. The research team at Nanhua University has already initiated the development of a "Metaverse of the War of Resistance Against Japan History" digital twin system. This project allows users to immerse themselves in the historical setting of the Hengyang Defense War through virtual avatars, and has currently secured provincial-level scientific research funding support. Virtual restoration technologies not only compensate for the irreparable damage to material heritage but also establish "digital backups" for the transmission of red culture, thereby holding significant value for historical preservation and educational purposes.

**Resource Integration and Sharing.** The core objective of the digitalization of red culture resources in Hengyang is to achieve the joint construction, sharing, and interconnectivity of data resources, which encompasses three specific dimensions. First, establishing a unified digital resource platform for Hengyang's red culture, wherein multimodal materials—including text, images, audio, and video—collected in earlier stages are described, cataloged, indexed, organized, and classified according to a unified metadata standard (e.g., the Dublin Core metadata framework), and subsequently stored within a network-based database (Qiu Kaiyu, 2026). To date, Hengyang has preliminarily established a specialized red archives

database, containing over 12,000 entries. Second, facilitating cross-departmental and cross-regional sharing of red culture resources among various sectors—such as cultural tourism, Party history, archives, and education—thereby dismantling "information silos" and driving a substantive transformation of red culture resources from "static preservation" to "dynamic inheritance." Third, exploring open-sharing mechanisms for the general public; within the framework of copyright compliance, certain digitized resources are made accessible to academic researchers, educational institutions, and the general public, thereby enabling the social application of red culture resources and the realization of their public value.

## **2.2. The Core Tier: Empowering the "Innovative Revitalization" of Hengyang's Red Cultural Resources Through Digital Reproduction Technologies**

Digital reproduction technology serves as the pivotal mechanism for advancing red cultural resources from "digital transformation" to "innovative revitalization." At its core, this approach leverages immersive technologies—such as virtual reality, augmented reality, and holographic projection—to enable Hengyang's red cultural resources to transcend the limitations of traditional static displays, thereby transitioning toward dynamic experiences and contextual perception. The primary objective of this strategy is to facilitate an experiential upgrade for visitors: shifting from mere "observation" to "perception," and from passive "spectation" to active "immersion."

**Immersive Scene Reconstruction.** The integrated application of technologies such as virtual reality (VR), augmented reality (AR), and holographic projection enables the effective reconstruction and restoration of Hengyang's revolutionary historical sites, addressing the shortcomings of traditional exhibition formats—namely, an abundance of physical artifacts coupled with insufficient contextualization (Zhang Ning, 2026). In September 2024, the Yanfeng District Committee and District Government of Hengyang, in collaboration with the Party History Research Office of the Hengyang Municipal Committee of the Communist Party of China, jointly launched a renovation project: converting a red-brick historic building beneath Hengyang's Yanfeng Hill into the "Xin She 1921" immersive cultural education experience base for revolutionary history. Within an exhibition space of nearly 500 square meters, technological means—including holographic lighting, scene restoration, and interactive screens—have achieved the revitalization of "Xin She" 's historical context and the redefinition of its significance: visitors can engage in a "virtual dialogue" with revolutionary predecessors in the "A Century of Mutual Gazing" exhibition area; experience the revolutionary ideals and fervor of a century ago within the recreated editorial office of \*The Vanguard\*; and feel the surging passion of Hengyang's youth in 1921 while immersed in the "Spark That Spreads Like a Prairie" theater experience. Leveraging holographic digital technology, this base guides participants to immerse themselves in historical scenarios and revisit

the revolutionary journey, thereby utilizing digital technologies to empower Party history education. This approach transforms static historical materials into dynamic, accessible narratives, allowing profound revolutionary heritage to be vividly presented. AR technology has also been employed to elucidate detailed aspects of "Xin She" 's history; Visitors can scan specific markers with their smartphones to trigger virtual avatars that provide explanations of historical events. Innovative design elements—such as "Red Footprint" floor decals and "Spark" check-in stations—have further become vital mediums to encourage citizens to pause, interact, and preserve collective memories. According to statistics, during its first month of operation, the base hosted over 120 group visits, with cumulative visitor numbers exceeding 8,000, thereby generating positive social impacts.

**Upgrading of Intelligent Exhibition Solutions.** Traditional red-themed exhibition venues commonly employ a singular exhibition model consisting of "display boards + physical artifacts + textual explanations," which suffers from limitations such as low information transmission efficiency, short visitor dwell time, and insufficient interactive engagement. In contrast, intelligent exhibition solutions leverage digital technologies to achieve a fundamental transformation in exhibition presentation methods (Wu Ruohui, 2025). In December 2025, the former residence of Xia Minghan reopened to the public following a 45-day quality improvement renovation. The renovated residence has deeply integrated modern technological exhibition technologies, establishing an AI experience zone and a multimedia display area, while introducing a smart guided commentary system capable of dynamically adjusting commentary content and speech rate based on the visitor's age and demographic characteristics. This renovation added over 100 historical audiovisual materials, enabling the system to reconstruct the revolutionary trajectory and spiritual essence of the martyr Xia Minghan, as well as utilize dynamic projection technology to recreate the historical scenes of his poetic compositions during his imprisonment and subsequent execution. Visitors, including students, can leverage AI-generated videos and precious historical footage to gain an immersive understanding of Xia Minghan's heroic deeds. The Shuikoushan Workers' Movement Memorial Hall has integrated functional modules—including an educational research center, a red-themed theater, an exhibition and performance center, and tourism service facilities—thereby constructing a comprehensive exhibition platform based on the "education + experience + service" triad. The installation of a 270-degree panoramic cinema hall and a mechanical motion platform allows visitors to experience the history of the workers' movement in an immersive manner, facilitating the venue's transformation from a conventional tourist attraction into an immersive red culture experience center.

**Digital Education Innovation.** The fundamental value of red cultural resources lies in their educational function. Digital education innovation can facilitate the transformation of red cultural resources into educational resources, extending and

expanding their function from "exhibition and display" to "curriculum-based ideological and political education" (Han Dameng, 2026). Taking the course *\*An Outline of Modern and Contemporary Chinese History\** as its core foundation, Nanhua University has interdisciplinarily integrated course resources such as *\*Interactive Design\** and *\*Floral Art\**, innovatively constructing a "Digital Story of China, Visual Narrative of Party History" curriculum-based educational community. Through diversified integration pathways—including "Party History + Academic Disciplines," "Party History + Technology," and "Party History + Art"—the university addresses the pain points and challenges in the field of ideological and political education. This course establishes a three-dimensional teaching model: "Enrichment · Interaction · Mobility." The "Enrichment" dimension focuses on the deep integration of Party history resources with local red culture, embedding local red cultural elements—such as the Hengyang Defense War and Xia Minghan—into the teaching content, thereby enhancing the relevance of the instructional material to diverse audiences. The "Interaction" dimension employs multi-path designs combining "online simulation + offline practice" to strengthen students' emotional resonance and value identification; a representative design involves requiring students to complete the "Retracing the Long March" task on a virtual simulation platform, followed by writing reflective essays offline. The "Mobility" dimension leverages virtual simulation technology to enable seamless switching and collaborative integration across multiple environments—classrooms, cultural venues, and the cloud—thereby overcoming the spatial constraints of traditional classroom settings.

### **2.3. The Divergent Tier: Leveraging Digital Media Technologies to Enable "Comprehensive Dissemination" of Hengyang's Revolutionary Cultural Resources**

Digital media technologies have transcended the spatiotemporal constraints and medium limitations of red culture dissemination, driving a transformation in dissemination approaches—from static presentations to immersive experiences, from one-way information delivery to co-creation and shared utilization, and from venue-centered models to user-centered paradigms—thereby significantly expanding the breadth and depth of red culture dissemination.

Integrated online and offline dissemination. Digital technologies have enabled seamless integration of offline experiences and online sharing in the dissemination of red culture, creating a virtuous cycle of "offline immersion, online dissemination, and offline traffic generation" (Xu Gongxian, 2026). During the 2026 Qingming Festival, the Hengyang Martyrs' Cemetery innovatively launched a new tomb-sweeping model titled "Press the Digital Key, Illuminate the Original Aspiration," and its "interactive experience stations" quickly became popular photo spots for visitors. At the highly favored "Tracing Red Footprints · Inheriting Red Genes" counting wall, visitors could simply press a button to become "red culture

enthusiasts," which simultaneously triggered the screen to display biographies and deeds of corresponding historical figures. The "check-in" gates, incorporating local Hengyang elements (such as Nanyue Hengshan and Huiyan Peak), attracted numerous visitors to take photos and share them on social platforms like WeChat Moments and TikTok, achieving integrated online and offline dissemination of red culture. This "offline experience, online dissemination" model has effectively expanded the reach of red culture among diverse audiences, particularly attracting active participation from the younger generation.

**Short Videos and New Media Communication.** Short videos have become one of the most impactful media formats in contemporary communication. In 2024, Hengyang hosted a seminar on the production and promotion of short videos about the Party's history, during which participants collectively viewed a series of Party history-themed short videos, including *\*How Much "Heat" Does Hengyang Really Have?\**, *\*I am a Successor\**, and *\*Twelve Hours at the Party History Museum\**. Each episode, lasting 3–5 minutes, visually and aurally distills the highlights of Hengyang's revolutionary history, presenting them through a fast-paced, high-contrast, and emotionally resonant approach. The five-minute short drama *\*Sand Will\** employs live performances by young students to recreate the pivotal moments and spiritual ethos of young members of the "Xin She"—such as Jiang Xianyun and Huang Jingyuan—who chose to devote themselves to the revolution; within one week of its release, the series garnered over 500,000 views. These short videos and new media productions leverage Audiovisual language and narrative pacing that resonate with young audiences to disseminate red culture, effectively overcoming the limitations of traditional communication methods—such as limited diversity, narrow reach, and insufficient emotional appeal—thereby serving as vital carriers for the "cross-boundary" dissemination of red culture. According to incomplete statistics, the cumulative total views of Party history-themed short videos in Hengyang across all online platforms from 2024 to 2025 have exceeded 30 million.

**Intelligent Service Platforms.** Supported by big data and artificial intelligence, these intelligent service platforms enable precise dissemination of red culture resources, personalized guided tours, and interactive feedback. The Hongtu π research team from Nanhua University conducted in-depth investigations into the intelligent infrastructure achievements of the Hengyang Anti-Japanese War Memorial Hall—including its "cloud memorial visitation" system, digital archive repository, and intelligent commentary systems—and also experienced the "Hengyang Defense War" digital sandbox on-site. Visitors can use gesture controls to reconstruct the battlefield dynamics and strategic deployments of the era, and by tapping on interactive hotspots, access detailed information such as unit designations, commander details, and accounts of specific battles. This immersive experience extends the dissemination of red culture from "fingertips" to "the heart," facilitating

a profound transformation from sensory stimulation to spiritual immersion. Furthermore, selected red culture venues in Hengyang have already deployed big data analysis systems for visitor flow, which leverage metrics such as visitor traffic, dwell time, and preferred exhibits to optimize exhibition layout strategies, thereby achieving intelligent venue operations.

#### **2.4. The Derivative Tier: Digital Technology Empowering "Copyright Protection and Value Enhancement" of Hengyang's Revolutionary Cultural Resources**

The application of emerging technologies—such as blockchain and digital watermarking—has provided reliable technical safeguards and institutional support for copyright verification, value circulation, and brand management in the reprocessing of Hengyang's red cultural resources. This approach represents an advanced form of digital empowerment, aiming to shift the protection and development of red cultural resources from a purely public-interest orientation toward a balanced approach that integrates public benefit with economic value, thereby achieving synergistic growth in both cultural and economic value.

**Digital Copyright Protection.** In the process of digital transformation and creative development of Hengyang's red cultural resources, practitioners commonly encounter practical risks, such as unclear copyright ownership and frequent instances of unauthorized use and misuse. For example, the copyright of certain historical photographs and documents involves multiple parties, making it difficult to establish clear rights during cultural and creative development; furthermore, some red-themed IP characters have been used for commercial purposes without authorization, undermining the solemnity of red culture. Blockchain technology, characterized by its immutability and smart contract capabilities, can provide end-to-end technical safeguards for the creation, rights confirmation, and trading of red cultural digital assets. Specifically, creators can upload their digital works to a blockchain platform to generate a unique digital identity credential; subsequent transactions, licensing, and circulation are then recorded on the blockchain, ensuring traceability and verifiability. This approach effectively prevents value depreciation and erosion of authenticity during the digital circulation of red cultural resources. Currently, relevant authorities in Hengyang are exploring the establishment of a digital asset registration platform for red culture, with plans to incorporate the digital resources of a first batch of key red cultural venues into a blockchain protection framework.

**Red IP Development.** The innovative transformation of red cultural resources requires not only protection but also revitalization; IP development serves as a crucial pathway to achieve value addition (Gao Yifan, 2025). Students in the Interaction Design program at Nanhua University integrated Xia Minghan's revolutionary conviction—"It doesn't matter if your head is cut off; what matters is whether your principles are true"—into their app interaction designs. By employing

the concept of emotional interaction, they guided users to reflect on their original aspirations and mission during app usage. This app has been widely adopted on campus and has garnered positive feedback. Meanwhile, students in the pressed flower art course transformed stories from China's Party history into diverse works—including pop-up books, emoticons, and cultural and creative merchandise. Among these creations, the Party history-themed pressed flower artworks won a silver award in the graphic pressed flower competition at the China Flower Expo and secured a bronze award in the 2023 A' Design Cultural and Creative Design Competition in Italy. Local enterprises in Hengyang have also begun exploring the development of red cultural and creative products, such as stationery sets themed around the workers' movement in Shuikou Mountain and commemorative badges featuring the Hengyang Defense War as their design element—all of which have achieved favorable market responses. These practices demonstrate that red IP development, empowered by digital technologies, can effectively propel red cultural resources through a spiral progression—from protective preservation to revitalized utilization, and ultimately to value creation—thereby establishing a virtuous cycle of preservation, development, and reciprocal reinforcement.

### **3. Pathways for Digital Empowerment of Innovative Transformation of Red Cultural Resources in Hengyang**

In response to the aforementioned practical challenges, it is essential to advance efforts in a coordinated manner across four key dimensions—infrastructure development, deepening of application capabilities, construction of dissemination matrices, and refinement of supporting systems—thereby establishing a systematic digital empowerment pathway and creating a comprehensive, four-pronged governance framework comprising "hardware support, software applications, dissemination and diffusion, and institutional safeguards."

#### **3.1. Strengthen the digital infrastructure for Hengyang's red cultural resources**

Digital infrastructure serves as the "hardware foundation" for the innovative transformation of red cultural resources; its existing shortcomings must be addressed as a priority (Guo Jingyi, 2024). First, implement a digital census project for red cultural resources. Led by the Hengyang Municipal Culture and Tourism Bureau, in collaboration with departments specializing in Party history research and archival management, a comprehensive digital collection and systematic archiving initiative will be carried out across over 300 revolutionary cultural relics and historical sites throughout the city. This effort will establish unified technical standards and metadata specifications to build a Hengyang red cultural resources digital database encompassing multimodal data—including text, images, audio, video, and 3D models. The project will be advanced in three phases, with the initial

phase focusing on covering 30 core red heritage sites. Second, advance a digital preservation project for red heritage sites. For key sites such as the former residence of Xia Minghan, the former residence of Luo Ronghuan, the Xiangnan Students' Union Memorial Hall, and the Shuikoushan Workers' Movement Memorial Hall, high-precision 3D scanning and digital modeling will be conducted to establish a comprehensive preservation framework integrating "physical restoration and digital twin technology." Under this framework, high-fidelity digital replicas will be generated alongside the physical restoration of cultural relics, enabling virtual exhibitions and academic research. Third, increase investment in dedicated funding. It is recommended to establish a special fund for the digital development of red cultural resources in Hengyang, with an initial allocation of no less than 20 million yuan. This funding will be jointly secured from municipal fiscal resources and social capital, with priority given to supporting the digital infrastructure construction of red heritage sites in rural areas. This includes equipping remote sites with portable digital acquisition devices and offline storage solutions to bridge the digital divide between urban and rural regions. Simultaneously, proactive efforts should be made to secure support from national and provincial cultural relics protection special funds, thereby establishing a diversified funding mechanism.

### **3.2. Deepening the Application of Digital Technology in Red Culture Exhibition and Education**

Exhibition education serves as the core output channel for realizing the value of red cultural resources, and it is essential to facilitate its transformation from "superficial presentation" to "deep immersion." First, promote the development of immersive experience scenarios. Drawing on the experience of constructing the "Xin She 1921" immersive experience base and the AI experience zone at Xia Minghan's former residence, more red cultural venues across the city should adopt immersive digital technologies—such as virtual reality (VR), augmented reality (AR), and holographic projection—to create a matrix of digital experience scenarios characterized by "one venue, one distinctive feature." For example, the Xiangnan Students' Union Memorial Hall could develop a VR experience project titled "Student Movements a Century Ago," centered on the theme of "Youth Revolution"; the Hengyang Defense War Memorial Hall could enhance its war narrative framework of "Urban Defense War" by developing a multiplayer online interactive war simulation project. Second, deepen innovation in digital education models. Building on the success of Nanhua University's "Digital Story of China, Illustrated History of the Party" course initiative, efforts should be made to drive the digital transformation of red education across primary, secondary, and tertiary education institutions, thereby establishing a red education ecosystem that integrates multiple domains—classrooms, physical venues, and cloud platforms. It is recommended that the Hengyang Municipal Education Bureau incorporate digital experiences in red cultural venues into

compulsory study tour curricula for primary and secondary schools, while developing corresponding online learning platforms. Third, advance the creative transformation of red cultural resources. Encourage the integration of local red cultural elements from Hengyang into emerging formats such as digital art, digital cultural and creative products, and digital film and television productions—for instance, creating animated works that reflect Hengyang's red history, developing narrative mobile games set against the backdrop of the Shuikou Mountain Workers' Movement, and producing thematic red microfilms—thereby achieving diverse expressions and innovative development of red cultural resources.

### **3.3. Establishing a Digital Dissemination Matrix for Hengyang's Red Culture**

Communication is the core link in expanding the influence of red culture, requiring the establishment of a full-media communication matrix that integrates "platforms, content, and channels." First, build a digital communication platform for red culture. By consolidating existing digital red culture resources in Hengyang, we will create the "Digital Red Hengyang" one-stop integrated service platform, incorporating functional modules such as resource search, virtual tours, online classrooms, interactive communities, and a cultural and creative e-commerce mall. This platform will enable integrated functionalities for online display, online education, and online interaction of red culture resources. The platform can be developed in accordance with national cultural big data system standards, ensuring interoperability with provincial and national platforms. Second, deepen the integration of online and offline communication efforts. We will promote the construction and operational model of the "Interactive Experience Station" at the Hengyang Martyrs' Cemetery, and deploy interactive, check-in-enabled digital experience facilities across more red-themed venues throughout the city—including smart photo-check-in devices, augmented reality (AR) treasure hunt interactive installations, and voice-controlled memory display walls—thereby facilitating a shift in red culture dissemination from passive reception to active participation. Third, expand new media communication channels. We will continuously release new media content products, such as short videos, micro-movies, and digital short dramas, themed around Party history, and establish a dedicated short-video production team for Hengyang's red culture. We will also deepen collaborations with internet content platforms like TikTok, Bilibili, and Xiaohongshu, leveraging algorithmic recommendation mechanisms to broaden reach. Simultaneously, we will cultivate a number of vertical red culture online IP accounts (e.g., "Red Guide" accounts), utilizing personified communication to enhance content appeal and public trust.

### **3.4. Enhance the supporting framework for the digital development of Hengyang's red cultural resources**

The support system serves as the "institutional framework" that ensures the sustainable operation of various development pathways. First, we will strengthen institutional and policy safeguards. This includes strictly implementing the relevant provisions of the \*Hunan Provincial Archives Regulations\* concerning the protection and utilization of "red archives," organizing the formulation of the \*Hengyang Red Cultural Resources Digitalization Special Plan (2026–2030)\* and its supporting implementation rules, clarifying the division of responsibilities among various government departments as well as cross-departmental coordination mechanisms, and incorporating the outcomes of red cultural resources digitalization initiatives into the annual performance evaluation indicator systems of relevant functional departments. Second, we will promote the integration of cross-departmental resources. A joint coordination mechanism for red cultural resources digitalization in Hengyang will be established, led by the municipal government official in charge, to consolidate efforts from multiple departments—including culture and tourism, Party history, archives, veterans affairs, education, and finance. Regular quarterly coordination meetings will be convened to dismantle information barriers between departments, thereby facilitating cross-departmental data sharing and operational synergy. Third, we will cultivate interdisciplinary professional talent. Leveraging local universities such as Nanhua University and Hengyang Normal University, we will offer "red culture digitalization" micro-specialties or specialized module tracks, establishing a curriculum system that covers core domains such as Party history research, digital data acquisition, interactive design, and digital dissemination. Simultaneously, we will launch the \*Hengyang Red Digitalization Talent Recruitment Program\*, offering preferential policies—including housing subsidies and research startup grants—to attract outstanding professionals from both domestic and international backgrounds. Fourth, we will establish a digital copyright protection mechanism for red cultural resources. Leveraging blockchain technology, Hengyang has established a digital asset registration platform for its "red culture," creating a comprehensive closed-loop management system that encompasses copyright verification, licensing transactions, and infringement monitoring.

#### 4. Conclusion

Digital technology-enabled empowerment of Hengyang's red cultural resources is a systematic, multi-stakeholder, multi-stage undertaking. This study develops a four-dimensional analytical framework—comprising foundational, core, diffusion, and derivative layers—to examine this process. The foundational layer grants these resources "digital life" through digital acquisition, virtual restoration, and resource sharing. The core layer enables "scenario regeneration" via immersive reconstruction, intelligent exhibition design, and innovative digital education. The diffusion layer integrates red culture into everyday life through online-offline

synergy, short-video dissemination, and smart services. The derivative layer provides institutional and economic support for sustained value realization through copyright protection and intellectual property development. These layers progress hierarchically and operate synergistically, forming a coherent logic for the digital transformation of Hengyang's red cultural resources. Crucially, digital technology should serve "empowerment" rather than "replacement." Innovation must inherit the "red genes" and "red legacy," uphold historical authenticity and spiritual solemnity, and maintain an appropriate balance between technological empowerment and value guidance. This approach enables Hengyang's red cultural resources to advance from static preservation through digital revitalization to value creation, offering a locally distinctive practical model and theoretical reference for the national digital transformation of red cultural resources.

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