Tec Empresarial
P-ISSN: 1659-2395; E-ISSN: 1659-3359

MEMORY LAYERING: NANJING'S STRATEGY IN THE PRACTICE OF URBAN HISTORIC LANDSCAPE DIGITIZATION

Gao Yuan
International College, Krirk University, Bangkok, Thailand, 002626@nuist.edu.cn

Abstract:
With the globalization of digital technology practice and research, the innovative application of digital technology in historic landscape conservation has emerged as a prominent focus and trend in the landscape architecture industry over the last 30 years[1]. Rapid urbanization has presented many communities with the dual challenges of preserving historical heritage while accommodating urban growth. This study explores the chronological stages of the evolution of heritage concepts and the emergence of the Historic Urban Landscape (HUL) concept, alongside its digital innovation elements, influenced by changes in time, place, city, technology, and public engagement. The research strategically analyzes Nanjing's existing historical resources, conservation and opportunities, policies, and current issues of development, with a particular emphasis on the conservation and planning policies of Nanjing, a city rich in history and culture, and the systematic challenges faced in the process.
Keywords: Historic urban landscape; Digital heritage; Nanjing

Cities worldwide are experiencing an unprecedented rate of growth in the twenty-first century due to the expansion of the global economy. The pursuit of a "modern" lifestyle has been fueled by industrialization since the turn of the 20th century, resulting in a significant increase in urban population, a high concentration of commercialized housing, a dearth of public and educational spaces, and the emergence of prominent pan-cultural phenomena.

Moreover, this rapid urbanization has increased the likelihood of catastrophic hazards linked to geography, ecology, and climate change. Social structures and places have become more fragmented as a result of swift development. Consequently, people are progressively realizing that the preservation of historic cities cannot keep up with the fast erosion of their transitional boundaries caused by urban requirements and changes.

In this way, a key challenge in the preservation of historic urban landscape heritage lies in precisely defining the concepts and connections among landscape objects, historic areas, and heritage conservation. Moreover, it demands avoiding the dichotomy between "historicity" and "modernity" [2], and striking a balance between the importance of conservation and development. Heritage preservation in urban historic landscapes has gained significant traction as communities recognize the value of safeguarding their cultural legacy amidst rapid urban expansion.

I. Stages in the Evolution of the Concept of Landscape and the Conservation of Landscape Heritage

1.1 Perception: From Natural Landscape to Artificial Landscape

The term "landscape" historically encompasses two primary conceptions: firstly, as portrayed in landscape paintings depicting countryside vistas; secondly, as the comprehensive visual experience of vast land expanses, particularly in rural areas, as depicted in classical landscape paintings and poetry during the 17th and 18th centuries[3]. Initially, the notion of landscape was primarily an artistic endeavor, representing a visual translation based on the artist's knowledge and understanding of the natural environment.

With the advent of the European Landscape Convention, "landscape" has been defined as an area perceived by people, shaped through the interaction of human activities with natural elements [4] . Additionally, the German term "Landschaft" denotes "area" or "region," indicating its various contextual uses in cultural geography. From this cultural-geographical perspective, landscape can be understood as a multifaceted concept rooted in both the natural environment and the cultural dimension. A turning point occurred at the beginning of the 20th century, accompanied by the rise of urbanization and the gradual integration of disciplines such as anthropology and sociology into relevant domains. This development has led to a heightened awareness of the reciprocal relationship between human beings and their environment, emphasizing the emergence of regional characteristics and folk cultures, thus giving rise to the concept of the cultural landscape.

Moreover, from the standpoint of environmental aesthetics and ethics, there is an increased emphasis on the "l'aesthesis" of collective sentiments and emotions within the environment (un sentiment de collectivité). This perspective encourages contemplation and construction [5]. In the urban context, encompassing both living and working spaces, a sense of historical existence and a distinctive "spirit of place" can be cultivated. Consequently, this approach fosters diversified ideas that transcend historical constraints and facilitate a more comprehensive approach based on the landscape level amidst the ongoing progression of globalization [6].

1.2 Evolution from Point Protection to Multidimensional Lamination

The landscape approach to urban historic preservation has emerged as a result of a longstanding debate in the artistic landscape community[7]. It is now widely acknowledged that heritage landscapes are socio-cultural constructs and serve as essential theoretical underpinnings for understanding the dynamic nature of urban landscapes. Over the course of nearly a century of urban heritage conservation, three significant conservation phases have been identified:

(1)The period of monolithic monument conservation, prevalent before 1962, focused on protecting individual monuments and ancient buildings using an isolated approach as the primary conservation method ;

(2)The period from 1962 to 2000 marked a shift towards linear and faceted regional protection. During this phase, conservation efforts gradually turned to encompass heritage corridors, heritage environments, and the overall coherence of the main body of historical heritage. There

was an increased emphasis on comprehensive reflection and analysis of shared attributes and cultural significance ;

(3)After 2000, the era of urban historic landscape conservation came into being. Greater attention was paid to cover the entire spectrum of heritage types, emphasizing the vibrant historical and social dimensions safeguarded under heritage protection. Additionally, paradigm research increasingly focused on achieving sustainable conservation and development outcomes.

Examining the evolution of heritage protection, it becomes evident that landscape, urban environment, and heritage preservation are aligning with a holistic, dynamic, multidisciplinary, and cross-cutting sustainable development trend. This highlights the progression towards a more comprehensive and integrated approach to safeguarding urban heritage.

Moreover, the concept of urban historic landscape has evolved, embracing the idea of multidimensional lamination in practice. This recognition of the diverse layers of history and cultural significance inherent in urban landscapes inspires innovation, particularly through the utilization of digitalization in heritage conservation efforts.

II. Digital Innovation Insights in the Evolution and Practice of Urban Historical Landscapes

2.1 Concepts and Methods

The concept of the Historic Urban Landscape (HUL) was initially introduced by UNESCO in the 2005 Vienna Memorandum. Subsequently, a series of nine expert meetings spanning from 2006 to 2010 elaborated on the "Historic Urban Landscape Approach" and its "Historic Urban Landscape Methodology." In 2011, the "Recommendation on Historic Urban Landscape" was issued, establishing that HUL embodies both methodological and conceptual connotations. In 2019, a feedback report on the second implementation and consultation was conducted, encompassing tangible and intangible cultural heritage, climate, natural environment, partnerships with local stakeholders, community engagement, regulatory policies, and so on. The progress of the HUL approach is marked by (1) the exploration of space and time vertically, strengthening the spatialtemporal dimensions of urban areas, transcending the historical vs. contemporary dichotomy, and forming a layered historical dimension with dynamic superposition of current progress; (2) perceiving the city's overall value from a living heritage perspective, encompassing evolving landscapes, diverse urban backgrounds, geographic contexts, natural environment, and regional historical heritage values characterized by return and sublimation.

2.2 Digital Methods and Innovative Features in Practice

In the "Recommendation on Historic Urban Landscapes," a set of six steps for specific urban practices is outlined, accompanied by the provision of four distinct types of Historic Urban Landscape (HUL) toolkits (as shown in Table 1). Across various global regions, over ten cities in Africa, Europe, North America, Latin America and the Caribbean, as well as Asia and the Pacific, have undertaken transnational pilot projects focused on HUL. These initiatives have proven highly effective in advancing tangible practices. They have culminated in the establishment of a

comprehensive historic landscape development model rooted in the principles of the "Historic Urban Landscape Methodology." This model emphasizes multi-party collaboration, technical synergies, and economic support. Furthermore, digital technologies have been significantly integrated to facilitate shared participation, heritage archives, and planning tools. Notably, the city of Ballarat in Australia stands out among the pilot cities, having successfully implemented the Historic Urban Landscape methodology to guide the creation of a localized digital heritage landscape archive. This pioneering effort serves as a significant innovation, offering valuable guidance and reference for future endeavors[10].

Table 1 The HUL Methodology Toolbox

Public participation tools	Community empowerment; Cultural mapping; Public awareness; Dialogue, Counseling
Knowledge and planning tools	Urban planning; Geographic information systems (GIS); Big data; Morphology and structural studies; Impact assessment/vulnerability assessment/policy assessment
Regulatory system	Laws and regulations; Traditional practices; Policies and programs
Financial tools	Economic research; Government subsidies; Public-private partnerships

1Creation of a Digital Platform through Public Engagement Within the framework of Historic Urban Landscape (HUL) methodology, the public is identified as a vital urban entity and active participant. A foundational model of civic engagement emerges, revolving around cultural mapping, narrative collection, and community-oriented work camp initiatives. Moreover, leveraging the advantages of networking, the creation of the Historic Landscape Network enables Ballarat to harness the public as a wellspring of information. This is achieved through a series of digitally transformed historical artifacts encompassing photographs, images, videos, paintings, and three-dimensional maps. These components span the realms of discovery, exhibition, discourse, and investigation. By fostering subject involvement, this approach stimulates heightened civic awareness and fosters a harmonious alliance with the urban environment (see Figure 1).

Figure 1 The four main service categories in the Ballarat Historic Urban Landscape webpage (image source: http://www.hulballarat.org.au/)

; 2 ; Enabling Living Conservation through a Digital Heritage Information Platform for Urban Historic Landscapes

Firstly, at the team level of heritage information data establishment, Ballarat has transcended the traditional dominance of historical and architectural experts. Instead, it has embraced a diverse range of expertise through a multi-disciplinary, nationalized, and interdisciplinary personnel composition. This approach enhances data plurality and broadens subject perspectives, focusing on the future user's needs. This enriches data resources and guidance for the myriad facets within the realm of the city's historical landscapes.

Secondly, in terms of geographic information data, the implementation of WEBGIS incorporates layered elements such as the natural environment, urban parks, public facilities, and significant urban vistas. These additions augment the existing urban historical landscape information, facilitating a more comprehensive and profound exploration of data requirements. This proactive approach ensures the accessibility, sharing, and continuous updates of the database, thus fostering an environment of openness and inclusivity.

Thirdly, advanced techniques including three-dimensional remote sensing, measurement, control, and virtual engine gamification are harnessed to create a dynamic three-dimensional city model. This immersive approach integrates intuitive, evaluative, and participatory elements. By establishing a 3D city, a platform is provided for more engaging and interactive materials and mechanisms, enhancing the understanding and engagement of stakeholders (see Figure 2).

In conclusion, the multifaceted strategies adopted by Ballarat underscore the importance of multidisciplinary collaboration, comprehensive data enrichment, and innovative technological applications in shaping a holistic approach to urban heritage preservation and development.

Fig. 2 Geographical information presentation interface of the Ballarat Urban Historic Landscape webpage (Image source: http://www.hulballarat.org.au/sliders.php)

In summary, the current trend of digitizing urban historic landscapes is intricately linked to the principles of urban historic landscape methodology. The methodological attributes of activation, expansion, holistic value, and multi-layered accumulation inherently shape the innovative imperatives of digital construction. With the ongoing surge in urban population due to the momentum of urbanization, urban historic landscapes are confronting dynamic and real-time transformations. Consequently, the creation of a digital model, operating at the nexus of preservation and development, emerges as an indispensable and unavoidable trajectory in response to these evolving dynamics.

III. Overview of Nanjing's Historic Urban Landscape and Strategies for Digital Development 3.1 Overview of Nanjing's Historic Urban Landscape

Nanjing, located in eastern China downstream of the Yangtze River and near the sea, spans an area of 6,587.02 square kilometers, with a built-up area of 868.28 square kilometers. It is home to a resident population of 9,314,700, with an urban population of 8,085,300 and an urbanization rate of 86.8%. Renowned as the ancient capital of six dynasties and the capital of ten dynasties, Nanjing holds significant historical and cultural importance as a vital birthplace of Chinese civilization and a center of politics, economy, and culture. The city boasts a rich historical heritage with diverse historical layers.

Nanjing's natural form features a captivating geographical landscape characterized by "a tiger crouching on a dragon's back" along with mountains, water, cities, and forests. It comprises historical urban areas, historical and cultural districts, historical landscape areas, and general historical sites brimming with relics and memories entwined within the water systems of the Inner and Outer Qinhuai Rivers. Notably, the city serves as an essential junction point of the Maritime Silk Road, linking the river to the sea, and also marks a significant intersection of the Silk Road.

Throughout different historical periods, the city's urban landscape has been shaped by the spatial and temporal evolution of the imperial palaces, resulting in urban historical landscape axes and the ring line of the city wall in Ming Mynasty. These cultural influences encompass elements from the Six Dynasties, Ming culture, and the Republic of China, giving rise to distinct urban planning,

protection, and development modes within and outside the city walls, characterized by unique spatial and temporal attributes.

Being recognized as one of the first national historical and cultural cities and a mega city, Nanjing holds a pivotal role as the core city of the Nanjing Metropolitan Area. Its development philosophy, emphasizing comprehensiveness and wholeness, has led to a distinctive conservation approach which means the preservation of Nanjing's historical lineage hasn't stress the key point or some specialities. Nevertheless, the "top-down" protection relying solely on governmental actions has faced challenges due to limited effectiveness and funding constraints. As a result, embracing a living conservation approach, supported by diverse funding mechanisms and active public participation, has emerged as a promising avenue to explore the preservation and development of the city.

Confronting the significant challenges of conserving and developing the urban historic landscape, Nanjing seeks to maintain and enhance the overall value of its urban historical heritage while catering to the demands of a more inclusive living, working, and residential environment, with the ultimate goal of promoting overall happiness. These considerations hold pivotal importance in shaping Nanjing's urban development strategy.

3.2 Policy Support for Digital Nanjing

With the global trend towards digitalization and the increasing importance of preserving urban historical and cultural heritage, Nanjing has recognized the significance of embracing digital technologies to safeguard its rich cultural legacy. As one of the early adopters of informatization construction, Nanjing was designated as a major informatization demonstration project in Jiangsu Province, known as "Digital Nanjing," in the early 2000s. However, despite these efforts, the city's digital economy is still in its early stages and lacks comprehensive coordination.

The recent "14th Five-Year Plan" for the development of the digital economy has provided Nanjing with new opportunities to further advance its digital city initiatives. As a prominent historical and cultural city, Nanjing plays a crucial role in leading and learning from strategic research on the digitalization of historical and cultural preservation and development. Discussions at the "Thematic Discussion Meeting" during the Third Session of the 14th CPPCC Nanjing Municipal Committee focused on key aspects such as comprehensive layout of the "digital economy", launching the "Scenario Project" to break down "information islands," promoting data integration with industrial transformation and urban governance, creating a "digital twin city" in the virtual world, and advancing comprehensive urban construction through digital technology.

Furthermore, the Nanjing Historic and Cultural Cities Expo 2021, themed "Belt and Road", multicultural exchanges, and the sustainable future of historic cities, has served as a platform for exploring innovative approaches to cultural heritage preservation and regeneration. The discussions have emphasized the importance of archives, museums, libraries, and the digitalization of cultural heritage artifacts and monuments. This expo has provided valuable insights and strategies for preserving and regenerating cultural heritage, aligning with Nanjing's

efforts to protect its historical legacy while embracing the transformative potential of digital technologies.

3.3 Memory Lamination -- Nanjing's Digital Development Strategy

The process of digitization involves the conversion of abundant real-life material into digital symbols, which are then stored and manipulated through computer-based unified processing. This approach ensures the stable preservation of digital information and concurrently provides a more dependable avenue for disseminating the inherent meaning of the information[13]. Over the past three decades of digital advancement, numerous successful cases have underscored the constructive role of digital preservation, consequently fostering the accumulation of various numerical methods and techniques.

Urban historic landscapes exhibit multi-layered spatial and temporal attributes, with their core centered around the communal groups inhabiting the city. Thus, a sensory-driven excavation guided by memory serves to bridge the informational divide within the realm of digital technology. Moreover, the unique attributes of each city, encompassing urban scale, environmental context, geographical features, climate dynamics, historical heritage, and cultural practices, warrant a targeted, personalized, and innovative application of digital technology within the context of urban historic landscapes. This approach necessitates gradual and pragmatic practice, coupled with ongoing innovation to ensure its efficacy.

3.3.1 Enhancing Services: Digital Integration and Service Optimization for Archival Information Resources

Archives hold paramount significance as original records of social activities and pivotal sources of information for the study of urban historical landscapes. Nanjing, steeped in rich history and culture, is home to numerous academic and research institutions, inherently generating high professional demand for relevant archival materials. However, the current archival system's services have not been adequately tailored for non-professionals, leading to underutilization of archival materials' social and cultural impact.

Guided by the urban historical landscape methodology, this study advocates for a staged promotion of archival information services through a digital humanities lens, transitioning from mere "information services" to comprehensive "knowledge services".

Initially, attention should be directed towards enhancing archival information services' features from a digital humanities perspective, upgrading them from standardized data to customized, personalized content. A user-friendly visualization design for web pages and mobile app interfaces should be implemented, streamlining readability and usability, while intensifying service promotion and interactive methods pertaining to urban historical landscapes, thereby bolstering user engagement possibilities.

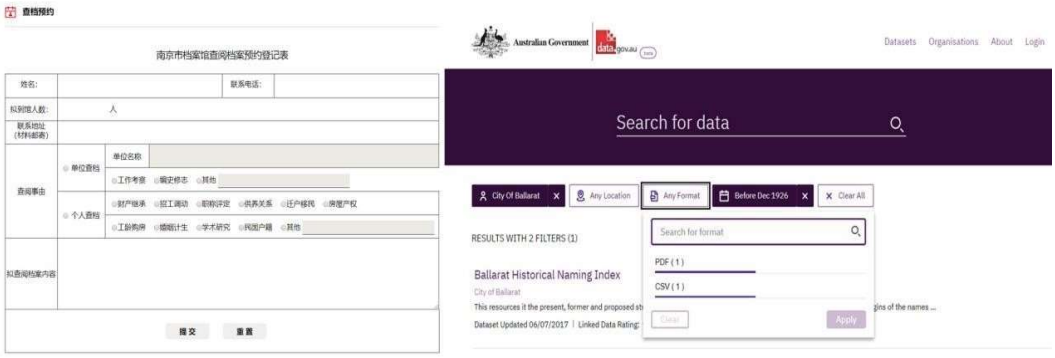

Figure 3 Comparison of user interfaces for urban archive data (image source:(http://dag.nanjing.gov.cn/daxc/cdyy/
https://www.data.gov.au/search?organisation=City%20of%20Ballarat)

Archives serve as invaluable repositories of social activities and essential information sources for understanding urban historical landscapes. In the context of Nanjing's rich historical and cultural heritage, coupled with its plethora of academic institutions, universities, and research centers, the inherent demand for relevant archival materials is substantial among professionals. However, the current archival services primarily cater to experts, failing to adequately extend their benefits to non-professionals, consequently limiting the societal and cultural impact of archival materials.
This paper proposes a phased advancement of archival information services within the framework of urban historical landscape methodology, leveraging the perspective of digital humanities to transition from "information services" to more comprehensive "knowledge services".
Initiating this transition, a deliberate focus should be placed on the attributes of archival information services through the lens of digital humanities, shifting from standardized data provision to customized and personalized offerings. Adopting a user-centric approach, an enhanced visualization design for both webpages and mobile app interfaces is recommended, streamlining accessibility and usability while amplifying the promotion of services and interactive features pertinent to urban historical landscapes. These measures aim to bolster user engagement and participation possibilities, contributing to a more inclusive and impactful archival information service system.

3.3.2 Perception: the Virtual and Realities of Digital Twin Cities

Digital twin technology offers a versatile framework that caters to diverse contextual demands within a city. Nanjing's urban historical landscape boasts a multifaceted composition rich in historical and cultural information across vertical and temporal dimensions. While some regions have enjoyed comprehensive historical heritage preservation over time, others have faded into obscurity or transformed into underground sites. The revitalization of these faded areas requires meticulous analysis of ancient maps, paintings, documents, and more, to ascertain their exact location, morphology, scale, and function.

The implementation of digital twin technology proves pivotal in harnessing the distinct cultural heritage of Nanjing, encompassing the cultures of Six Dynasties, Ming Dynasties, Republican, Red, and Modern Revolutionary history. This approach facilitates three-dimensional, accurate, and vertical digital restoration and preservation through mapping, model representation, and interactive engagement.

From a mapping perspective, drone-enabled digital orthophoto and LiDAR scanning can amass spatial data of historical urban spaces, culminating in high-precision three-dimensional models. This resource supports informed decision-making for urban planning. Leveraging ARCGIS and the BIM platform further ensures the archival and gradual enhancement of landscape information. This dynamic database facilitates subsequent restoration and conservation efforts, elucidating clearer ancient and modern spatial connections.

Additionally, the fusion of virtual reality, augmented reality technologies, and gamification principles enhances the interactive experience. Immersive three-dimensional modeling, precise rendering, and simulations via virtual software engage users through web pages and mobile apps. This approach deepens user comprehension of multi-dimensional historical information, enabling intricate exploration of spatial structures, textures, decorations, and details.

Employing the MARS digital twin engine, wearable VR equipment enables users to immerse themselves within simulated historical scenes, dynamically adjusting elements such as seasons, climate, flora, human activity, and transportation. This immersive approach finds applications in thematic exhibition halls, museums, and public experience spaces within urban historical landscapes, affording the public an opportunity to engage with historical environments and spaces through virtual modes.

This study showcases the efficacy of digital twin technology in advancing urban historical landscape preservation, exemplified by Nanjing's multifaceted cultural heritage[4][5] .

Fig. 4 Operation of MARS digital twin engine under wearable VR gear (Image credit: City of Light DIVA product brochure)

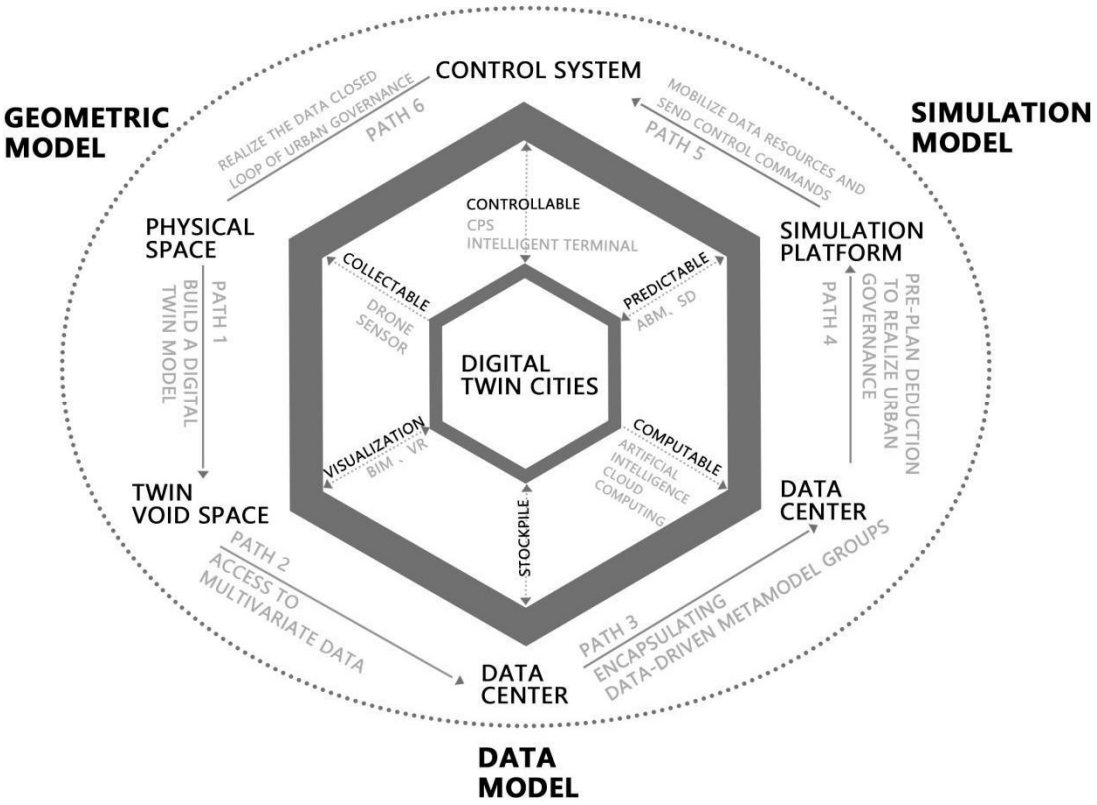

Figure 5 Data model framework under digital twin city (Image source: Illuminated City DIVA product brochure)

3.3.3 Engaging the Community: Urban Narratives and Collective Memory

The public constitutes the fundamental building block of a city and represents the largest audience group and active participants. In the context of the historic urban landscape approach, municipal information services take on a crucial and central role. From a technical standpoint, transitioning from one-way information dissemination to a multi-dimensional information interaction mode is essential. The public can select and customize related historical heritage content or introduce new thematic categories, forming additional thematic groups that foster communication and interaction among the public.

Moreover, the public's memories and stories related to the city's themes are diverse and abundant. These encompass family anecdotes, personal photographs, videos, records of intangible cultural heritage events, as well as accounts of significant times, places, and experiences in their lives. This approach authentically captures the temporal and spatial fragments of the city's historical landscape, augmenting the information network within the digital model.

Furthermore, by utilizing the platform, a comprehensive "memory map" of the city emerges as a result. This process encourages public involvement in urban planning, community development, heritage preservation, and more. It enables individuals to share their perspectives on specific projects, while researchers can conduct offline investigations and research to establish a productive cycle of information gathering and feedback, fostering a bottom-up mode of

information exchange. For example, the Xinanli neighborhood has introduced a night tour concept centered around Ganjiaoyun, highlighting its distinctive street culture and appealing to the interests of the younger generation. Meiyuan Xincun neighborhood has revitalized its red culture theme by creating a prominent red street culture line, facilitating the comprehensive revival of culture, industry, and space. Leveraging the "online + offline, content + social, traffic + retention" community matrix, these initiatives capitalize on regional cultural creativity as a product and emphasize "light tourism, heavy experience, pro-expression, heavy dissemination" strategies to accentuate memory highlights and labels. These efforts immerse people in a desirable urban cultural lifestyle.

In line with this, the nostalgic revival of Nanjing South Lake East Road rekindles the ambiance of the 1980s, while the Xiaoxihu neighborhood's symbiotic courtyard, resettlement housing, and 24hour bookstore provide innovative ways for local residents to share their living experiences with visitors. By fostering improved public participation in various endeavors such as urban planning, community revitalization, heritage preservation, and design, researchers can facilitate increased engagement and public awareness, further solidifying a constructive mechanism for information collection and feedback through offline explorations.

IV. Conclusion

China is in the midst of a transition from being a "digital city" to evolving into a "smart city," a transition that holds significant potential for advancing the digital preservation of urban heritage. The introduction of the Historic Urban Landscape (HUL) Approach has provided a comprehensive and contemporary framework for the conservation of heritage landscapes. This approach promotes a collaborative strategy for heritage conservation within a global context, giving rise to a novel model for safeguarding these valuable landscapes.

In this process, the establishment of archival information has gained strength through synergistic engagement among experts, the public, various interest groups, and governmental bodies. This collaborative effort has shaped distinct development characteristics and cultivated consensus during the application of urban historic landscape practices. Simultaneously, it offers insights into the future trajectory of digital development.

Furthermore, our practical experience in urban historic landscape conservation has underscored a profound understanding of the term "landscape." It is not solely confined to the present visual scene and form; rather, it encompasses the multi-dimensional layering and accumulation of historical landscapes over time and space. In this analogy, time forms the structural framework, while memory imbues it with life, functioning as the vital essence intertwined with the temporal framework.

The challenge lies in translating this perceptual memory into actionable and meaningful information. This necessitates the deployment of a comprehensive and systematic approach, grounded in the urban historical landscape methodology, to execute a holistic "memory layer" construction. As China's urban landscape transitions towards a more intelligent and interconnected future, the digital conservation of heritage landscapes is poised to become a vital and

transformative endeavor that captures the essence of the past while seamlessly integrating it into the evolving urban fabric.

References

1. Matero F, Santana M. Int'l Symposium on Heritage Recording & Information Management in the Digital Age (SMARTDoc Heritage) [EB/OL]. 2010. [2011-06-10]. http://whc.unesco.org/en/events/637.
2. Zhou Jianyun. Historic Landscape Characterization - Linking "Conservation Areas" and "Historic Urban Landscapes"[J]. International Urban Planning.2020(1):1-18.
3. Jokilehto J. Reflection on historic urban landscapes as a tool for conservation[M]//Ron van Oers, Sachiko Haraguchi (eds). Managing Historic Cities, World Heritage Papers Series No. 27. Paris, UNESCO World Heritage Center, 2010: 53-63.
4. Council of Europe. European Landscape Convention [Z]. Florence, 2000: Article 1.
5. Nathalie. Blanc. Toward environmental aesthetics [M]. Henan University Press, 2015.
6. Whitehand J. The Making of the Urban Landscape [M]. The Institute of British Geographers Special Publications Series no. 26, Blackwell Publishers, Oxford UK, 1993.
7. UNESCO.Recommendation on the Historic Urban Landscape,in Records of the General Conference 36th session[EB/OL]. [3022-33]. 10th Nov 2011 United Nations Educational, Scientific and cultural Orgnization:Paris, France.http://whc.unesco.org/uploads/ United Nations Educational, Scientific and Cultural Orgnization: Paris, France. Activites/documents/ Activity-47-21.
8. Liu Yihim. A preliminary study on the theory of "anchoring-layering" for recognizing and protecting urban historic landscapes [D]. Beijing: Tsinghua University, 2014:179-210.
9. Yang Chen. Digitizing Heritage Landscapes - Digitalization Practices and Their Innovativeness in the Historic Urban Landscape of Ballarat, Australia. China Garden. 2017,33(06):82-88.
10. Zhou Lan, Tong Benqin, Su Zemin, Cheng Maoji. Protection and Renewal of Nanjing Old Town in the Rapid Modernization Process [M]. Southeast University Press.2004.
11. Liu Zhifeng. Research on the Protection of Historical Lineage Based on the New Media Platform of Digital Technology "Synergy"---Taking Nanjing Republican Culture as an Example. Artistic View. 2019, (07):98-101.
12. XU Man, GUO Yajing. Research on digital protection of intangible cultural heritage in Qiqihar[J]. Theoretical Observation,2013(07):105-106.