

# Research on Interaction Design Strategies for Digital Cultural Creations of Changzhou's Intangible Cultural Heritage

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**Abstract:** Under the wave of digitisation, digital cultural creation is reshaping the public's perception and experience of intangible cultural heritage (ICH). By elaborating on the media evolution process of ICH digital cultural creation, combined with the development status quo of ICH digital cultural creation, the interaction design strategy of Changzhou's ICH digital cultural creation is proposed from the three dimensions of enhancing value identity, stimulating emotional resonance and promoting cultural symbiosis. It provides theoretical support for the innovative development of Changzhou's ICH digital cultural creativity. Also, it explores a practical path for the inheritance and activation of ICH culture in modern society.

**Keywords:** digital cultural creation; intangible cultural heritage of Changzhou; interaction design

## 1. Introduction

In May 2022, the General Office of the CPC Central Committee and the General Office of the State Council issued the Opinions on Promoting the Implementation of the National Cultural Digitisation Strategy, which explicitly proposed that by the end of the "14th Five-Year Plan" period, the cultural digitisation infrastructure and service platform will be completed. The online and offline integration and interaction and three-dimensional coverage of the cultural service supply system will be formed [1]. In August 2023, the Ministry of Culture and Tourism issued the Digital Resource Collection and Recording for Digital Protection of Intangible Cultural Heritage to regulate further the digital protection of intangible cultural heritage, which not only points out the direction of the development of the cultural industry but also provides a practical guide to the digital inheritance and innovation of intangible cultural heritage [2]. The arrival of the era of new qualitative productivity aims to actively explore new technological aesthetics to create new forms of artistic expression, and then build a new relationship between art and science and technology. The continuous development of cutting-edge technologies such as 5G communication technology, virtual reality and artificial intelligence has become the core force for promoting cultural heritage and innovation. Changzhou, a famous historical and cultural city in Jiangsu Province, is rich in intangible cultural heritage. However, there are still many challenges in the practice of digital cultural creation of ICH, such as the continuity and innovativeness of content updating, the shallow expression of cultural connotation, the limitations of user interactive experience, the maturity and popularity of technology application, and the difficulties of cross-cultural communication. Interaction design, centred on user experience, provides new perspectives and solutions for developing ICH digital culture and creativity through its narrative, emotional and intelligent design principles. Therefore, an in-depth study of the interaction design strategy of Changzhou's ICH digital cultural creations is of great significance for enhancing the effect of cultural communication, and even strengthening the soft power of Changzhou city and promoting the sustainable development of the economy.

## 2. Medium Transmutation of Digital Cultural Creation of ICH

### 2.1. Early Stage: Initial Application of Digital Media

At the initial stage of ICH protection, physical media assumed the key role of display and transmission

through museum exhibitions, documentary archives and physical collections. While these traditional methods can visually display cultural and artistic details, their interactivity and accessibility are limited due to their reliance on physical space. From the early 1990s, with the development of the global Internet, digital images, videos, web pages, databases and platforms have become new forms of recording and sharing NRM content, greatly expanding its accessibility and audience base. Internationally, the Memory of the World project of the United Nations Educational, Scientific and Cultural Organisation (UNESCO) not only covers a wealth of NRH content, but also initiates the journey of digitising important documents, music and images, and opens them up to the global users through online databases and websites, which greatly enhances the dissemination of and accessibility to NRH content. It has also opened the journey of digitising important documents, music and images, and made them available to global users through online databases and websites, greatly enhancing the dissemination and accessibility of the content [3]. For example, international cooperation projects such as "Digital Michelangelo" and "Sulman Mummy" have accurately restored and digitally stored precious sculptures, architecture and archaeological materials with the help of laser scanning, CT scanning and other technologies [4]. In the 21st century, institutions such as the National Diet Library of Japan and the British Museum have transformed traditional art treasures into online resources [5]. There are also the Asia-Pacific Intangible Cultural Heritage Database and the Google Arts and Culture Platform, which allows users to browse ICH items online through a combination of text and images [6].

China's efforts in this area can be traced back to 2010, with the main objectives of constructing a comprehensive resource database, developing digitisation standards, and systematically capturing and recording information on NRH items. For example, the digitisation of ICH projects implemented by the National Library of China and the big data platforms for ICH set up by provinces and cities are important work carried out under this framework. In Changzhou, for example, the official website of its cultural centre has a special column on ICH, which focuses on ICH-related policies and regulations, lists, and information on inheritors. In particular, Changzhou's traditional craft skills inheritance and innovation platform, as well as the "ICH + AI" perception system, provide the public with convenient access to and participation in ICH culture, while also promoting the static protection and digital revitalisation of ICH. It can be said that this phase has achieved cultural integration across media, geography time and space, reproduced the richness of non-legacy such as traditional skills, oral transmission and cultural performances, and demonstrated openness and inclusiveness on a global scale.

## ***2.2. Transition: Interactive Digital Media Development***

With the widespread popularisation and in-depth application of mobile internet technology, multi-functional digital cultural and creative products such as applications (APPs), WeChat applets, public numbers and HTML5(H5) interactive web pages are increasingly emerging. Through touch gestures, voice transmissions and other interactive methods, these products guide users to explore a wide range of narrative content, such as text, images, videos and games, and actively participate in the creation of new derivative works. Globally, different countries are actively exploring the use of interactive digital media in the dissemination of ICH culture. Japan's "eNational Treasure" project, through upgrading the functions of its APP, has successfully realised the free dissemination of images of ICH works in multiple languages, breaking down the language barriers of culture [7]. While the "StoryCorps" project of the United States makes clever use of the APP to use the voices of participants as a carrier. In the United States, the "StoryCorps" project cleverly makes use of the APP to record and archive precious historical sounds with the voices of the participants as the carrier, leaving valuable historical memories for future generations [8]. In China, the "Yunyu Dunhuang" app has inspired users to explore Dunhuang culture with its unique Dunhuang colours and themes, as well as daily mural stories [9]. The "Fun Wooden Character Printing" H5 work launched by the Intangible Cultural Heritage Research Institute allows users to experience the wonders of wooden character printing in a small game, realising the modern inheritance of traditional culture [10]. In addition, the "Changzhou Intangible Cultural Heritage Promotion Association", "Changzhou Wujin District Culture Centre", "Changzhou Arts and Crafts Research Institute", "Canal Intangible Cultural Heritage The "Experience" public number and the "Tianqing Culture and Tourism" app have successfully attracted the attention of a large number of users by their portability, ease of use, fun and interactivity. This touch-type interactive experience mode has completely subverted the traditional one-way information transmission mode, stimulating the user's willingness to participate, and making the cultural experience readily available and ubiquitous.

Virtual Reality (VR), Augmented Reality (AR), Holographic Projection and other technologies are widely used in the dissemination and experience of ICH culture globally by constructing immersive scenarios and allowing users to experience the unique charm of ICH culture in an immersive way. For

example, the Geelong Digital Outdoor Museum (GDOM) in Australia integrates NRM stories into public spaces through 3D virtual immersive environments <sup>[11]</sup>. In Korea, the "ARTE 270" platform and the "Jeju View" virtual application enable realistic audiovisual immersion, demonstrating the potential for cultural heritage development <sup>[12]</sup>. In China, several projects have used these technologies to create rich cultural experiences, such as the Chaozhou Opera Project and the Dongyang Bamboo Weaving Virtual Experience System, all of which allow users to enjoy interactive, entertaining, and at the same time, gain a sense of immersive participation <sup>[13]</sup>. A typical example of this is the immersive performance of the "Qi Liang Night Banquet" in Changzhou. The works "Embroidery" and "Sweet White Wine" are respectively a wonderful interpretation of the national ICH project Changzhou Thread Stitch Embroidery and the district-level ICH project Yucheng Brewing Technique Xi Opera. While "Double Mill Pushing" vividly illustrates the artistic charm of the national ICH project Xi Opera. The "Double Mill Pushing" is a vivid interpretation of the artistic charm of the national ICH project of Xi opera. At the same time, the audience was honoured to taste the delicacies of ICH cuisine such as shrimp cakes from Qingguo Lane, Buyi fish balls, Hengshanqiao Baiye, and Changzhou Crab and Pork Xiaolongbao. This all-encompassing experience transformed the audience from mere spectators to in-depth participants, deepening their cultural tourism experience. It can be seen that the technological penetration of digital cultural and creative works has built a bridge of "online", "presence" and "embodiment" of cultural exchange. More importantly, the essence of ICH culture has successfully crossed over from traditional museums and exhibition halls to the wider public sphere, making cultural heritage more accessible to the public for understanding and appreciation, and changing the way the public experiences cultural tourism.

### ***2.3. Innovation: Integrated Media and Territorial Interaction***

With the advent of the Artificial Intelligence era, a series of cutting-edge technologies such as blockchain, digital twins, and meta-universes have begun to make rapid inroads into the boundaries of NCH, thus opening up a new chapter in the dynamic transmission of NCH. Significantly, the evolution of media integration is fundamentally reshaping the paradigm of interaction between the public, creators and cultural heritage. Through the perfect integration of multiple technologies such as virtual reality (VR), augmented reality (AR), artificial intelligence (AI) and the Internet of Things (IoT), the display and experience of traditional crafts and their production processes are being innovated, giving rise to an interconnected ecosystem of cultural heritage communication. Taking the "Talking" sculpture cultural exhibition in southern Italy as an example, the FEDRO creation platform can capture audience preferences, behaviours and contributions, automatically generate text and user descriptions of artwork biographies, and provide intelligent guided tours for visitors during exhibitions <sup>[14]</sup>. For example, the "Wu Leno" weaving technology conservation project in Suzhou, China, used a digital database to model Leno's weaving technology, and virtual reality technology to build a loom model and develop a simulation library <sup>[15]</sup>. The integration of these technologies opens up new avenues for empirical exploration, cross-border exchanges, and ensuring the sustainable development of traditional crafts and techniques in a modern context.

The new model of global interaction relying on the comprehensive coverage of the network and digital technology has completely broken the time and space barriers to the dissemination of cultural heritage. At the same time, blockchain technology, with its distinctive characteristics of decentralisation and security traceability, provides a solid technical guarantee for the authentication and transaction of digital assets, especially promoting the development of the digital collection market. It has now become a popular trend in the digital art market and has also allowed the excellent traditional Chinese culture to return to the vision of young groups with a new look. Domestic digital collections have made remarkable achievements in distribution and sales. For example, Alibaba launched the "Nine-coloured Deer" and "Dunhuang Flying Sky", Tencent's Dunhuang mural series, as well as cooperation with the Dunhuang Museum in the "China Collection Digital" collection <sup>[16]</sup>. The model of "ICH + digital collection" not only stimulates the enthusiasm for ICH creation of various subjects, opens up new growth space for ICH IP, but also facilitates the rapid expansion of the ICH cultural industry, and achieves permanent preservation and wide dissemination in the digital era.

## **3. The Current Development of Interaction Design for Digital Cultural Creations of ICH**

### ***3.1. Interpretation of Identity: The Problem of Convergence of Content***

The early interactive design of ICH cultural communication, with novel audio-visual elements and symbols of strong visual impact, successfully attracted extensive attention from a large number of the

public. However, this kind of market effect, which relies solely on superficial forms, does not have durability. Firstly, many works tend to imitate successful cases or popular design trends in the pursuit of market effects<sup>[17]</sup>. This phenomenon has led to a high degree of similarity in visual style, presentation and content themes, which in turn has plunged the works into the predicament of homogenised competition. This convergence not only weakens the market attractiveness of the works but also makes the public's perception of the uniqueness and diversity of ICH culture. Secondly, excessive attention to external visual impact and formal novelty often leads to the neglect of the core values and deep-rooted cultural elements of ICH projects. The value of intangible cultural heritage is far more than its surface form can cover, it contains the unique stories of the inheritors, exquisite production skills and deep traditional customs, which cannot be compared with the mere pursuit of form novelty. In addition, the intangible nature of intangible cultural heritage is mainly reflected in the spiritual value, emotional experience and national cultural characteristics contained in the process of inheritance. The value of these intangibles far exceeds their material manifestations and is the part that the public needs to understand and identify with. Therefore, it is necessary to follow the principles of returning to living culture, highlighting individual characteristics, and highlighting diversity and creativity, to deeply explore and disseminate the cultural essence behind them. Through innovative interactive design concepts, the public can fully understand the multiple values of cultural heritage from various perspectives, such as perception, cognition and aesthetics, to enhance their cultural identity and inject new vitality into the inheritance and development.

### ***3.2. Emotional Resonance: The Phenomenon of Emotional and Experiential Distancing***

In ICH digital cultural and creative design and user feedback, the public's expectations of such products have gone far beyond aesthetic appearance and practical functions, and they pursue a deeper level of immersive experience to achieve a harmonious resonance of psychology and cognition. However, the intensification of market competition and changes in user attitudes have posed new challenges to designers. On the one hand, although interaction design enhances user engagement and immersion, it may also trigger emotional disconnection. Complicated operation processes, inhumane interface design or interaction elements that are inconsistent with ICH culture may cause users to feel confused and alienated, thus reducing their emotional experience of ICH culture. On the other hand, the historical background of ICH culture is crucial to the transmission of its emotional value, and the general public unfamiliar with these backgrounds may only regard the ICH elements in digital cultural and creative works as immersive experiences and interesting interactions, making it difficult for them to deeply understand the deeper emotions conveyed by the works. In addition, the virtual nature of digital cultural and creative works may also give users a sense of "unreal" distance. Therefore, it is necessary to pay attention to the integration of practical functionality with humanistic temperature and emotional depth. This reflects the aesthetics of experience in interaction design, the core of which lies in the "humanistic reversion", i.e. taking the real needs and deep feelings of people as the starting point of design and emphasising the core position of user feelings and experience in design<sup>[18]</sup>. If interaction design leads users from sensory experience to cognitive exploration, meets the needs of users' high-level thinking activities, and provides diversified behavioural support, it can open up a new way for deep users' self-investment and in-depth exploration. Through in-depth mimetic interaction with the digital media of cultural heritage, the public can establish a deep connection and spiritual resonance.

### ***3.3. Cultural symbiosis: resonance between history and reality***

The core concept of cultural symbiosis lies not only in the coexistence and harmonious development of multiple cultures but also in the pursuit of building a close link between history and reality, to promote the continuous inheritance and innovation of culture. When exploring cultural symbiosis, it is important to face up to the gap that exists between historical cultural heritage and modern society. The divide is particularly prominent in the development and promotion of ICH digital cultural creations, which is rooted in the differences between the deep historical and cultural connotations of ICH and the aesthetic and consumption habits of modern society. On the one hand, the fast-paced life and ever-changing aesthetic trends of modern society have made traditional ICH culture appear obsolete and anachronistic, resulting in its limited dissemination and acceptance in modern society<sup>[19]</sup>. On the other hand, some of the ICH internet platforms suffer from distortion or excessive commercialisation, thus undermining their original cultural value and significance<sup>[20]</sup>. It is worth pondering how to balance tradition and modernity in the development of digital cultural creations of non-legacy, and how to maintain the original flavour of culture while giving it the connotation of the new era. In addition, in the process of promotion, it also faces the problems of market acceptance and consumer awareness. Although digital cultural creations

provide virtual interactive platforms, interactive installations and immersive exhibitions for the dissemination of ICHculture, factors such as consumers' cultural background, aesthetic preferences and consumption habits will affect the acceptance and recognition of these digital creations. Therefore, how to carry out targeted development and promotion based on respecting the original authenticity of cultural heritage, combined with market demand and consumer psychology, is an important issue to be solved in the field of ICH digital cultural creations<sup>[21][22]</sup>. It can be seen that digital cultural creativity is a bridge connecting history and reality, which not only helps modern society reinterpret and inherit precious cultural heritage but also stimulates the cultural enlightenment and historical influence of cultural heritage on the development of contemporary society, while digital technology seamlessly connects the cultural time and space embedded in cultural heritage with the daily life of contemporary people. Digital technology seamlessly connects the cultural time and space embedded in cultural heritage with the daily life of contemporary people. This connection facilitates the combination of the virtual value of cultural heritage with real needs, enriches the public's cultural perception, and promotes the symbiotic development, modern transformation and innovative evolution of ICHcultures through in-depth interactive exchanges, thus shaping the cultural paradigm and zeitgeist of the new era.

#### **4. Interaction Design Strategies for Changzhou ICH Digital Creation**

##### ***4.1. Deeper Interactive Narratives to Enhance Value Identity***

Narrative design is a form of "storytelling" used by designers to achieve in-depth communication between users and products<sup>[23]</sup>. When combined with interaction design, it provides users with the possibility to participate in the story. Narrative interaction design allows users to be more actively involved in the interaction with the product and to influence the narrative process based on their choices and behavioural trajectories. This approach allows users to become fully immersed in the story by creating a "story universe" with multi-dimensional characters, rich plots and vivid visuals<sup>[24]</sup>. At the same time, by designing an "interactive process" that includes triggering interest, information exploration, story development and immediate feedback, users can perceive the story more deeply and engage in real-time dialogue with the story, thus obtaining a more profound and unforgettable experience.

In the narrative interaction design of ICHdigital cultural creations, the focus should be on the laying out of story clues, the rendering of emotional levels, the design of plot development and the purpose of cultural inheritance, to highlight the dynamic connection in the interaction system of "designer-user-product"<sup>[25]</sup>. Specifically, the logical clue of "user triggers the story through the object - the object carries the cultural event - the cultural event enhances the understanding and recognition" guides the user to have a deeper understanding of the spiritual core of the ICHculture. Taking Changzhou's national ICH traditional arts as an example, the stories of Jintan engraves the paper, embroidery with overlapping threads in different directions, Liuqing amboo carving, Changzhou comb, and Changzhou ivory carving are integrated into digital products. For example, by building a digital workshop for Changzhou's ICHtraditional handicrafts, users can enter the workshop from a first-person perspective and experience the production process of traditional skills. In this process, users can decide the direction of the whole narrative by choosing different materials, tools and patterns, and thus participate in creating unique derivative works. Users' real-time feedback and personalised needs also provide designers with valuable clues to optimise the product, thus continuously refining and enhancing the interactive experience. This interactive relationship, forming a virtuous cycle, not only contributes to the effective dissemination and inheritance of Changzhou's ICHculture and the promotion of local culture but also brings a positive impact on Changzhou's tourism development and social economy.

##### ***4.2. Emotionally Immersive Design Stimulates Emotional Resonance***

Emotional logic, intentionality and consciousness not only profoundly influence the way individuals perceive and process information but also shape the way society is constructed on a macro level. The power of emotion cannot be underestimated, and it plays a crucial role in the shaping process of technical design, just as it can deeply touch the emotions of the audience in artworks<sup>[26]</sup>. Therefore, the integration of emotional design into the interaction design of ICH digital cultural creations is particularly important for enhancing the user experience and facilitating a deeper connection between the audience and cultural heritage. Emotional design in this context focuses on creating experiences that trigger users' emotional resonance, which in turn makes cultural heritage closer to the public and more appealing. Donald Norman divides emotional design into three levels: instinct level, behavioural and reflection level<sup>[27]</sup>. The instinct and behavioural levels focus on the intuitive sensory stimulation and direct emotional response generated

by the user in the immediate experience, while the reflective layer is dedicated to triggering the user's deep cognitive processing and emotional connection, to achieve the touch and resonance of the heart (Figure 1. shows an example).

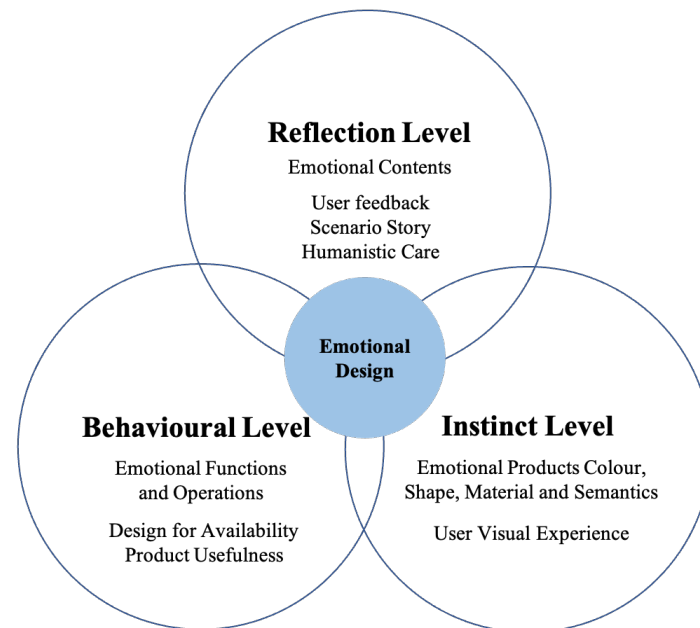


Figure 1: Donald Norman's three-level theory of emotional design

The combination of Changzhou pear paste candy, dried turnip and cannabis cake production techniques and emotional interaction design can develop interactive game APP applications, virtual interactive platforms, interactive devices and so on. (1) At the instinct level, combine the visual elements of colour, shape, material, and semantics of the pear paste candy, dried turnip, and hemp cake, designing appealing game icons and interfaces to capture users' attention quickly. (2) At the behavioural level, the game simulates the production process of ICH skills to provide an interactive experience. For example, the boiling steps of Changzhou pear paste candy, including martial fire boiling, simmering paste, playing cold plate, pouring mould, etc.; the curing process of Changzhou dried turnip, such as selecting materials, slicing, smothering and curing, etc. are designed as a game task to enhance the user's sense of participation; and the simulation of the production process of Changzhou cannabis cake such as mixing, stirring, kneading, wrapping, shaping, and baking. (3) At the reflection level, the game intersperses stories about the historical origins and inheritance of Changzhou pear paste candy, the relationship between Changzhou dried turnip pickling techniques and local culture and customs, and the importance and cultural significance of Changzhou cannabis cake in the local society. Therefore, the emotional interaction design aims to guide users to understand the cultural connotations behind the production process while experiencing it, to stimulate interest in and recognition of Changzhou's ICH culture, and to deepen their understanding of and respect for skills.

#### 4.3. Explore Intelligent Design for Cultural Symbiosis

With the rapid advancement of AI technology, the progress of interaction design has become more and more significant, and its transformation is not only limited to technological innovation but also embodied in the change of thinking mode from "human-machine dialogue" to "human-centred design". In short, intelligent interaction design has gone beyond simple functional dialogues to explore more deeply the actual environment, psychological state and emotional experience of users in the process of operation, and is committed to building a new interactive environment that is close to users, efficient and convenient [28]. Through deep learning and intelligent extraction techniques, such as association search, data mining, semantic integration and image recognition, intelligent interaction design has successfully transformed the artistic paradigm and cultural connotation of cultural heritage into products that are easily accepted and applied by the public, thus realising the re-exploration of the value of cultural heritage and a brand new way of expression [29]. This not only promotes the cognitive migration of users to the information space and cyberspace but also forms a deep resonance with users at the level of emotion and consciousness, depicting a magnificent picture of the harmonious coexistence of audience, art and culture.

Taking Changzhou comb as an example, through customised virtual digital people, the image and

exquisite skills of non-genetic inheritors are accurately reproduced. It not only supports the automatic generation of voice and text information but also realises the rapid batch output of content, thus efficiently creating and disseminating the brand IP image of Changzhou comb. Further, in Changzhou museums, cultural halls, ICH museums and other venues, digital virtual tour guides and cultural lineage interpreters are created, virtual theatres are constructed, and traditional ICH such as theatre, art, acrobatics, dance and other traditional ICH are presented in a new form by combining the virtual with the real. Performing with virtual digital people not only replicates the excellent skills of outstanding inheritors but also performs with real people on the same stage, enhancing the audition experience and expanding the audience <sup>[30]</sup>. These highly realistic virtual digital people, have more emphasis on embodiment and naturalisation, in the form of multi-modal human-computer interaction, with the multi-modal interactive information input, fusion, processing and feedback technology, to achieve natural question and answer, emotional interaction, user assessment and data analysis and other functions. The ultra-realistic audio-visual experience dissolves the cultural and geographical barriers and becomes a common medium of communication and interaction for audiences from different cultural backgrounds. More importantly, this experience makes history and modernity, virtuality and reality mingle in people's perception, truly realising the "cross-dimensional" coexistence of history and people, which strongly promotes the symbiosis and integration of cultures and meets modern society's new expectations for cultural experience.

## 5. Conclusion

Embedded in the torrent of the digital era, deeply excavating the essence of narrative design, fully experiencing the connotation of emotional design, and actively exploring the possibilities of intelligent design, we are committed to strengthening the value identity of Changzhou's intangible cultural heritage, awakening the deep-seated cultural and emotional resonance of the general public, and then realising the grand vision of cultural pluralism and symbiosis. The interaction design strategy of Changzhou Intangible Cultural Heritage Digital Cultural Creation has injected new vitality into the inheritance and revitalisation of Changzhou Intangible Cultural Heritage and is expected to make the Intangible Cultural Heritage blossom more splendidly in the protection, inheritance and innovation.

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