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# Study on APP Interface Design Under the Context of "Intangible Cultural Heritage" Inheritance and Innovation

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**Abstract.** The paper gives an overview of mobile applications for introducing Chinese intangible cultural heritage (ICH) from the perspective of interface design, analyzes and compares advantages and disadvantages of ICH APP on the present stage, and explores a trasdisciplinary approch to solve problems.The interface design of ICH APP require collaboration between different disciplines by interactive experience (including the ways of storytelling and adopting new technology to improve interactive experience), information architecture, and visual design(including logo design, graphics, color and format) to try to solve the current problems of ICH inheritance and innovation.Make the interface of ICH APP a bridge to communicate users and intangible cultureal heritage(ICH).

**Keywords.** Interface design, intangible cultural heritage, transdisciplinary approach

## Introduction

Cultural heritage includes material cultural heritage and intangible cultural heritage[1]. Material cultural heritage is a cultural relic with historical, artistic, and scientific values, such as: ancient tombs, ancient buildings, cave temples, etc. Intangible cultural heritage (ICH) refers to all kinds of living in close contact with the masses in non-material forms[2]. It is a practice, representation, expression, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces that are considered by UNESCO to be part of a place's cultural heritage [2].UNESCO divides the world ICH into orally-spread legend, pattern of manifestation, performing arts, social practice, etiquette, festival activities, knowledge and practices relating to natural world & the universe and traditional handicraft arts, etc. [3] In China, the ICH is divided into ten categories: 1) folk literature; 2) traditional dance; 3) traditional music; 4) traditional drama; 5) Chinese folk art forms; 6) traditional athletic sports amusement acrobatics; 7) traditional art; 8) traditional skill; 9) traditional medicine; 10) folk custom [4]. Moreover, each category is an integrated and enormous system (see Figure 1), which is composed of many specific sub-contents[5], such as that the traditional skill contains shadow puppets, Lunar New Year's paintings, paper cuttings, ceramic craft, face-change, embroidery, clay sculpture, wood engraving, wood carving (see Figure 2), etc. In 2006, 2008, 2011 and 2014, China had ratified and named four batches of the national ICH lists, totaling 1372 items [5].

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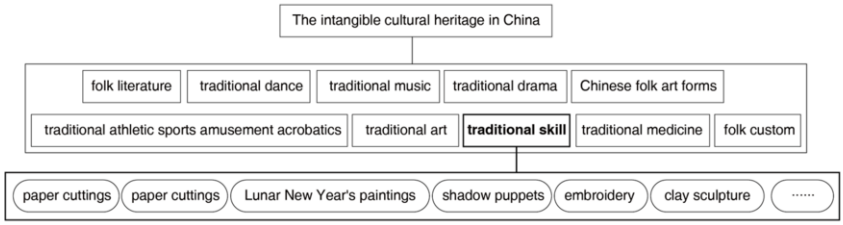


**Figure 1.** The intangible cultural in China.

**Figure 2.** Traditional skills.

ICH has the following nature: 1) Inheritance: Its inheritance is mainly through family and mentoring, through word of mouth; 2) Liveness: Cultural connotation is conveyed to the audience through human activities; 3) Intangibility: Mainly depends on whether people can directly perceive the image of things; 4) Regionality: Different regions, races, belief groups, individuals have different "inheritance"; 5) Complexity: complex " "Intangible" constituents[6], such as: Mongolian folk music for long tune and local language, literature, history, religion, customs, etc. are closely linked; Complex production processes, such as the fans of Shaoxing, have to go through 72 processes and more than 100 handmade process. These five characteristics have undoubtedly also increased the difficulty of protecting and transmitting "inheritance"[7]. According to Xinhua News, as of May 2017, with the death of more than 250 representative inheritors in China, many old crafts that have been circulating for hundreds of years are on the verge of being lost, such as: bamboo weaving process, paper cutting, clay sculpture and so on.

The application of digital technology and information technology will become an important part of intangible cultural heritage (ICH) protection [8].With the popularization of 4G networks and the development of mobile technologies, mobile terminals, such as smart phones and tablet computers, have been favored by people with a high degree of human-computer interaction[9]. APP has also become one of the favorite type in the design field. In addition, it can integrate resource information to a certain extent to make efficient use of resource information, and break the regional differences in space and create an exclusive platform for the protection and development of intangible cultural projects, which is conducive to the innovative development of intangible cultural heritage (ICH) projects. However, the existing APP

of CHI also has the following problems: 1) There are few types. At present, there are only a dozen types of "non-legacy" items available for download in the Android Store and the Apple App Store: "Intangible Cultural Heritage" "Inherited in China", "Guangdong Province Intangible Cultural Heritage Electronic Map", "Sichuan Nonmaterial Culture "Heritage" "Chinese tea culture tea", "picking green", "Craft of Master-Ceramic", etc.; 2) Single function; 3) Poor interaction with users. The CHI APP mainly adopts the traditional way of writing, pictures or video [9]; 4) The information level is not clear; 5) The interface design has no characteristics; 6) The user experience is poor.

## 1. Interactive experience of ICH APP

The new manner of experiencing will attract more users of intangible cultural heritage (ICH) APP. As the loyal fan of mobile intelligent terminals, the populations of the generation after 80s and 90s ranging from 15 to 35 years old occupy the absolute quantity, besides they are likewise the key population who download mobile applications[9]. The users of this age level have high level of education and strong learning ability. Moreover, there emerges a variety of new technologies during their growth process and they have strong adaptability and need for fresh things. Furthermore, due to the limitation of language and text, even if the APP is constructed very well, foreign friends who do not understand Chinese may not be able to use it normally. Therefore, this chapter combines actual cases and proposes two paths for ICH APP interactive innovation: 1) the combination of storytelling and interactive experience; 2) the combination of new technology and interactive experience.

### *1.1. Combination of Storytelling and Interactive Experience*

The ICH APP class incorporates the story content into the interactive experience, which can attract users' attention. Sadness and happiness in the story, dramatic and interesting, and even educational can all be easily understood and absorbed by users[10]. For example: "Craft of Master-Ceramic" APP (see Figure 3), aims to give users a better understanding of the full range of cultural information of traditional craftsmanship. This APP function is mainly divided into: 1) basic introduction; 2) production experience link; 3) exchange sharing link.

**Figure 3.** "Craft of Master-Ceramic" APP.

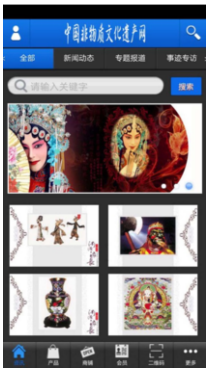

**Figure 4.** "CICHN" APP.

In the function of Production Experience, the user can practice the main technological process of Ceramic's manufacturing operation through interactive games, besides the produced cloisonne can likewise participate in the auction. In addition, the money to be auctioned can likewise be used to buy more production materials such as the shapes, patterns and blue materials, etc. The promotion of the manufacture element can also make the manufacture of cloisonne more exquisite and then it will be auctioned for more money. This process creates a growth-based user experience mechanism. The incentive factors can fully mobilize the enthusiasm of the user and further improve the user loyalty for the product. As for the APP product, the meaning of the user loyalty is not only regarding the promotion of user activation, but also regarding the improvement of the brand value and the effect of the paid conversion rate[11]. Combine the knowledge narration of the ICH with the user experience can improve the user viscosity of employing the APP through the incentive mechanism, which will play auxiliary function for understanding the content and knowledge of the ICH.

However, if the ICH APP simply narrows down the content displayed on the big screen to the APP version, then users are likely to uninstall the APP after reading it, such as: "China's Intangible Cultural Heritage Network" APP (CICHN APP) (see Figure 4). The APP, which based on the mobile Internet platform, to some extent, has the latest industry information resources and a lot of non-heritage types[12]. However, because of the poor user experience, the user was rated as a half star (a total of five stars), and the user volume continued to decline. After June 26, 2016, the version was not updated again. Developers have given up on the operation of the "China Non-material Cultural Heritage Network" APP.

Therefore, the APP interface design, introducing the ICH resources, can improve the availability and growth of APP through the combination of the narrative content and interaction experience of users.

### *1.2. Combination of new technology with interactive experience*

The emergence of new media has broken through time and space constraints, resulting in a variety of spatial dimensions, connecting two-dimensional, three-dimensional, and four-dimensional spaces, forming a design experience of virtual reality. Due to the special nature of some ICH projects, it has been difficult to avoid the distortion of some technical information since the long-term heritage. Visitors can only imagine through pictures and limited written records, and it is difficult to understand the original features of ICH. The AR augmented reality technology and GPS positioning navigation technology provide conditions for the integration of virtual and reality[13]. In simple terms, AR is a technology that superimposes digital information onto a real object or scene[14]. GPS is the technology that locates and navigates objects through satellites[15]. For example: the "Digital of Old Summer Palace" APP applied these two technologies cleverly as shown below:

1. Based on the digital restoration model, the virtual scene and site status were merged (see Figure 5). Through the smart mobile terminal, the lens shot the ruins, and what was presented to us on the screen was a bustling. With the advent of AR technology, it is possible to use virtual three-dimensional images to restore the scenes of ancient palaces in the past year;
2. Providing navigation line navigation within the park through the precise positioning of GPS modules (see Figure 6). Most smartphones have sensor

devices such as electronic compasses, gyroscopes, displacement sensors, and light sensors. The exquisite aspect of the APP is that these devices can sense the changes in the current orientation and elevation of the audience.

**Figure 5. Figure 6.** "Digital of Old Summer Palace" APP.

The combination of new technologies and ICH APPs will undoubtedly open up new paths for inheritance and facilitate the display and dissemination of intangibles. For the ICH project that is on the verge of distortion, it can be relied on new technologies, combined with computer-generated 3D models and real scenes, and the page information presentation and browsing methods restore the technological process and techniques of ICH resource design and production ,work scene[15]. The transfer of information can be achieved from "reading" or "listening" to a simple "seeing".[16] Interesting interaction enables users to understand the characteristics of ICH products from all angles in an all-round and three-dimensional manner, inspiring viewers to understand traditional cultures. In fact, overseas museums have long used this technique, such as the "Museedu-Louvre" APP of the Louvre in France and the "e-Museum" APP of the National Institute of Cultural Affairs in Japan[17].

## 2. Information architecture of ICH APP

Information architecture is the organic organization of several pieces of information[18]. The information architecture focuses on the content structure: how to organize the content and mark it so that users can easily find the required information. Through the information framework, a channel is established between the user and the information, and relevant information is quickly presented to the target user [19]. An effective interface information architecture of APP can improve the availability and searchability of information so that it can be more efficiently and orderly recognized by users. In the design of the ICH APP interface information architecture, there are mainly two functional levels that are often encountered: One is a flattened hierarchy[20], which means that the belongings belong to the same hierarchical parallel relationship. This hierarchical relationship is suitable for the APP with few columns; The other is the tree level, which means that the information architecture is more hierarchical or there is a subordinate relationship between tasks or the task process has a context, suitable for the presentation of task-based experiential interface information architecture[20], such as: " Craft of Master-Ceramic " APP. The information architecture of the APP, where the eight steps of Production Experience are described in Chapter Two. In addition, the overall information architecture of the " Craft of Master-Ceramic " APP fully considers the following factors:

- Similarity of functions. Combining the functions of similar nature through classification, such as: Describing Craft, Masterpiece, History, and Celebrity

as sub-frames under the General Introduction of the main frame, thus forming the entire product framework;

- The relationship between function and function. There are generally parallel, inclusive, and mutually exclusive relationships. If it is an included relationship, the information architecture can be vertically oriented[21]. Example 1: Eight steps in Production Experience; Example 2: When a non-left APP involves the purchase of non-leftover products, The relationship between picking, ordering, paying, and mailing is the relationship between upstream and downstream. To mail, you must pay first. To pay, you must first place an order. If you want to place an order, you need to pick it first. If it is a tie, there is no link between the two functions. Relationship, then you can consider the horizontal information architecture(see Figure 7);
- The frequency of use of the function. The higher the frequency of use is, the more important this function is, and the more important it is to place this function in the most accessible place. When performing information architecture, priority is given to building this function as the core architecture, such as the functional core of the "Craft of Master-Ceramic" APP. The architecture is: General Introduction, Production Experience, Communication and sharing.
- The system's scalability. Products from scratch, from to grow up, grow from strong to strong is a step by step, product features are constantly increasing and improving. When doing information architecture, considering the future scalability of the system, good product general information architecture is very stable[22].

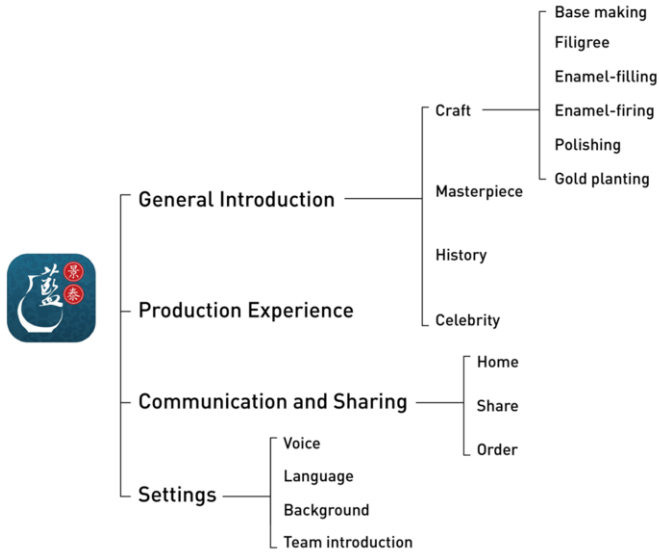


**Figure 7a.** The information architecture of the "Craft of Master-Ceramic" APP.

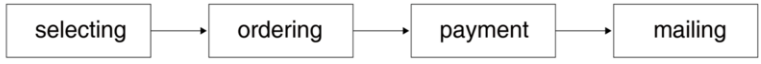


**Figure 7b.** Vertical information architecture.

## 3. Visual design of ICH APP

Resonance with visual senses often encourages people to love non-heritage cultures. Dr. Norman's "emotional design" also emphasized the importance of emotional resonance[23]. The emotional factors should be included in all stages of the development and operation of the APP. This chapter focuses on the visual elements of the interface. The visual design elements in the ICH APP interface mainly include logo design, visual graphic design, color design, and format design.

### *3.1. Logo design*

Logo Design is a public communication symbol with symbolism [24], which expresses certain meaning with refined image and conveys specific information by means of people's symbol recognition ability and associative thinking ability The expression pattern of the existing ICH APP's logos(see Figure 8) are summarized as follows:

- Font logo, which is the logo constituting by characters. Characters is not only the carrier of language, but also the system of visual sign; the characters not only can express the concept, but also can convey information appealing to the visual way and the delivered information is relatively accurate [25]; If the logo is processed in the graphical form of characters and combined with decoration, exaggeration and beautification, a more intense visual effect can be achieved;
- Figurative logo, which is designed by the concepts and elements refined through the ICH theme. It will have intense intuitive effect;
- Abstraction logo. When figurative figures and words cannot express the connotation of "non-heritage" items, they can be expressed through abstract graphs and are highly creative.

**Figure 8.** The existing ICH APP's logos.

### *3.2. Interface graphs design*

In the ICH APP interface design, we can select the specific elements in combination with the relative ICH theme. For example, elements are extracted from raw materials, tools, major techniques, patterns, and textures in ICH resources. In addition, materials with typical Chinese traditional elements can also be applied to the ICH APP interface design, such as the graphic elements of the "Daily Imperial Palace" APP (Figure 9), using a special expression way of Chinese painting.In the APP, the graph of "Traditional cabinets represent the function of "ALL", "Folding" represents "Topic", "Money Bag" represents "Collection", "Old Jade" represents "Setting", "Brush" represents "Note", and "Chinese lute" represents "Sound Effects, etc. All of these provide rich visual language for the design of ICH APP interface.

In the design of some ICH APP interfaces, some designers fuses materials, crafts, or tool elements in the ICH resource with the APP function of "Navigation", "Borders", "Buttons", etc. For example: "SUNMAO" APP (see Figure 10 and 11) is perfect both in beauty and morality, and is full of traditional culture and modernity. Of course, integrating Chinese traditional elements into the ICH APP interface graphics does not mean simply copying or embezzling traditional graphics, but rather understanding and understanding traditional graphics, and on this basis, learning to gradually explore, change [26].The transformation of traditional graphics makes traditional graphics a new creative point and starting point for their own design.


**Figure 9.** "Daily Imperial Palace" APP.

### *3.3. Interface color design*

When users first use the APP, colors often give the user intuitive and deep impression. In china, traditional color culture often uses yellow, blue, red, black, and white as positive colors and links with the earth, wood, fire, water, and gold of the five elements respectively [27], and puts Chinese people's ideas on the natural universe, ethics, and philosophy [28] (see Figure 10). These Chinese traditional colors can provide references for the color design of ICH APP interface.For example: First, the system of red, the Chinese symbol of auspicious colors, derived cinnabar red, rust red, brick red and other red [29]. It is often selected by designers as the color of ICH APP interface; Second, the system of yellow, the Chinese people's skin color, is regarded by ancients as the central color and symbolize the color of the earth; Thrid, the blue color symbolizes the springtime of vitality. And, many painters fall in love with the system of green, using green as the main color when they are painting.

Besides, the combination of blue-violet and yellow is also suitable for the performance of exquisite and extravagant ICH themes, such as the "Craft of Master-Ceramic" APP (see Figure 2). In addition, the combination of red, black and white ash of different lightness and purity conveys the solemn and aristocratic temperament; different shades of brown as a neutral color can be matched with colors with higher purity and lightness, and are suitable for the theme of traditional clay sculpture[30]; Black and white gray color can show a strong ink style, such as "SUNMAO "APP (see Figure 11);

### *3.4. Interface format design*

The format design on ICH APP interface can draw lessons from the esthetical principles of Chinese traditional art aesthetics, that is to pay attention to the whole beauty, the beauty of neutrality and the beauty of artistic conception [31] and to highlight the temperament and style of ICH APP. "SUNMAO" APP (see Figure 11) applies the space in Chinese painting to the interface format and coordinates the relationship between various visual elements. The loose and free layout will also make

the APP interface more elegant, stylish, fresh and full of rhythm [32]. In addition, Chinese ancient texts were written from the top down to the vertical, and the vertical lines of Chinese traditional paintings were accompanied by red seals [33]. The seals played a role in balancing the screen composition and enriching the effect of the screen in Chinese painting. Applying the vertical text to the layout of the stamp to the ICH APP interface design can convey a strong classical atmosphere and echo the theme of ICH.

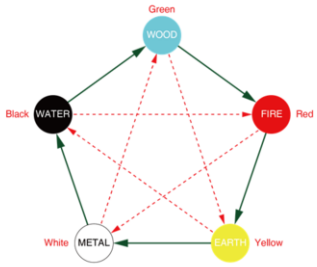


**Figure 10.** Chinese traditional color culture.

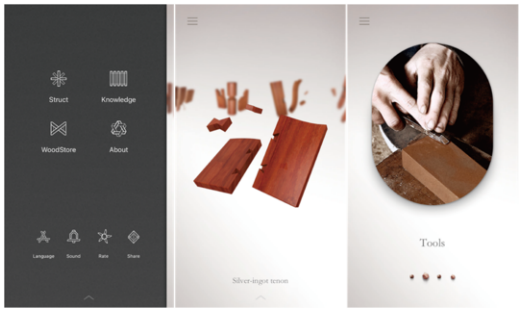


**Figure 11.** "SUNMAO"APP.

## 4. Conclusion

The transdisciplinary approach of combining digital media technology and experience design, information architecture, and visual design knowledge into APP is valuable to inherit and innovate intangible cultural heritage, although most of the ICH APPs are still in the bud stage and developed stage. It can be seen from the above APP case that the vivid interactive narrative, the interactive experience of virtual reality, and the visual resonance can grasp users' interests, increase the number of users and improve users' stickness. More importantly, through APP's interface, users have deepened their konwledge and understanding of ICH. When users are sharing with others, it means that ICH is being spread twice. The knowledges of ICH are constantly being shared and disseminated, which is potentially a good mode to break the inheritance and innovation limitation caused by its own nature, like inheritance, liveness, intangibility, regionality and complexity. The inheritance and innovation of ICH are brought by transdisciplinary views and knowledge.

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