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INTERACTION DESIGN AND CHINESE TRADITIONAL CULTURE DISPLAY

The Combination and Discussion of Modern Interactive Means
and Chinese Traditional Culture Display Methods

Supervisor:
Andrea Di Salvo

Candidates
Jia Wei
Liu Mingyue
Zhou Ziting

Abstract

1 TRADITIONAL CULTURE IS VERY IMPORTANT

Traditional culture is the culture passed down by predecessors. Here we must pay attention to the meaning of the word culture. What is culture? The interpretation of Cihai¹ is that "culture is the sum of material wealth and spiritual wealth created by mankind." This is a big concept, that is, as long as human beings create it, it can be attributed to the category of culture. The things created by humankind are now found to be in advance, so the cultural history of humanity is continuously advancing.

Traditional culture is the essence of human beings that have been precipitated for thousands of years. Learning to understand a prevailing culture can provide a deeper understanding of history. Traditional culture and intangible cultural heritage do not represent the preserved cultural

¹ The Cihai is a large-scale dictionary and encyclopedia of Standard Mandarin Chinese.

relics and superficial technical reservations, but the inheritance of spiritual literature. The so-called religious culture is a collection of wisdom. Through some small traditional techniques or cultural relics, one can feel the aspect of the political philosophy and national character.

Traditional culture is the crystallisation of human civilisation and a summary of the wisdom of life among the ancestors. The development of all things has the same similarities. It is also the history of the evolution of the thoughts and behaviours of different nations in the world. With the past and the present, it can improve people's depth and breadth of thinking. Nowadays, all countries and societies in the world are aware of the importance of traditional culture and are actively promoting the preservation and dissemination of traditional culture.

2 WHY IS CHINESE TRADITIONAL CULTURE?

China has a long history and a broad regional base. The collision of various national cultures is extremely rich in traditional Chinese culture. The Chinese nation has a

history of 5,000 years of civilisation, which begins with written records and has never been interrupted. This is rare in the world. Other countries have an account earlier, but

the middle has been discontinued, and some texts have not continued. For example, Indian culture is also one of the four ancient civilisations. In history, Indian Buddhist culture has had a significant influence on China, but due to historical reasons, it has caused cultural faults. So that the Indian historian behind the British, with the "Da Tang Western Regions" to calculate the archaeological address. This example also shows Chinese traditional culture has a strong tolerance. Buddhism was introduced into China from India during the Eastern Han Dynasty. After being introduced to China, it was gradually influenced and transformed by Chinese culture and became another unique landscape in Chinese traditional culture. It has played an essential role in the development of national culture. It can be said that Chinese culture has benefited from Indian Buddhism. Indian Buddhism has been carried forward in China, and later absorbed by Chinese culture, and profoundly influenced the Song and Ming dynasties of future generations, showing the great inclusiveness of Chinese traditional culture. Therefore, the descendants have the theory of confluence of Confucianism, Taoism, and Buddhism. It can be seen that Chinese traditional culture is significant in the world, and it has far-reaching significance not only for China

but also for the development of the world. It is worthy of respect, attention, and learning.

Why is Chinese traditional culture so influential but not well disseminated at this stage?

First, due to historical reasons, China has been in an unstable state after the Qing Dynasty. It is difficult to be preserved, not to mention spread, at this stage. After the founding of the country, the long-term war led to a lack of material, economic and educational resources. People are most worried about food and clothing. It has developed to the present that traditional cultural communication has gradually improved.

The second now belongs to the Internet era, the explosion of information. It is more important for people to obtain information in a short time to get a pleasant feeling. The combination of traditional culture and new technology still needs to be strengthened, so now more is the spread within the cultural circle. But everything has a double-faced nature. The popular self-media at this stage can make too many traditional cultural communicators have a platform to continue to inherit the skills and culture.

3 THE CURRENT MODE OF COMMUNICATION

1) How does China spread Chinese traditional culture?

First, in the process of disseminating various kinds of information in traditional culture, it is full of multiple forms of conventional cultural knowledge, including classic cultural comprehensive news, regular cultural-political articles, classic cultural in-depth articles, regular cultural theory reviews, and regular cultural interviews and reports.

Secondly, in the media, some TV programs broadcast through the daily work of exhibiting cultural relics or cultural relics repairers and displaying the stories behind the cultural relics through the stage.

The third is to exhibit pavilion.

The fourth is to spread products through the development of products, such as the development of some apps, and launch a joint product with the brands that young people like.

2) How do foreign countries spread Chinese traditional culture?

First of all, in the oriental-themed activities, the spread of some typical cultural elements, but limited to the surface, or even a stereotype.

Second, there is cooperation between governments, such as the Belt and Road, to further spread traditional culture through economic and technological exchanges.

The exhibition of the third museum and the private collection exhibition spread.

Finally, there is a passive spread, and some limited products that some brands need to develop for the market contain products of traditional Chinese culture.

The problem we face at this stage is that in the process of cultural exchange, a large number of cultural elements are lost or misunderstood. The slow-paced culture conflicts with the fast-paced modern life, and the two do not integrate well. And traditional Chinese culture has not been well combined with advanced technology.

4 THE IMPACT OF NEW TECHNOLOGICAL MEANS ON LIFE

At today's ever-changing technology, we believe and look forward to the arrival of various future technologies, which

have been accompanied by new technology changes that have brought us unique lifestyles. From the current perspective,

we can understand that the direction of development of new technologies must be diversified. From the use of nano-robots in the medical field, 5g of future commercial purpose, to the theory of network blockchain technology, these technologies are bound to affect every aspect of our lives.

We can refer to the tremendous changes in people's lives from the 3G to 4g era to understand that entering the 5G era will open more new lifestyles that we can't imagine now. In the next 5 to 10 years, all work that needs to be considered within 5 seconds will be replaced by artificial intelligence, and

artificial intelligence will prevail. When the Internet of Things is realised, the items are about to usher in singularity. For example smart air conditioning temperature control, quick cooking, mixed reality makes it possible to communicate in the same space whenever and wherever.

Whether traditional culture can be passed down, the most important thing is to keep pace with the times and combine with modern science and technology. So from this starting point, we have carried out the following research.

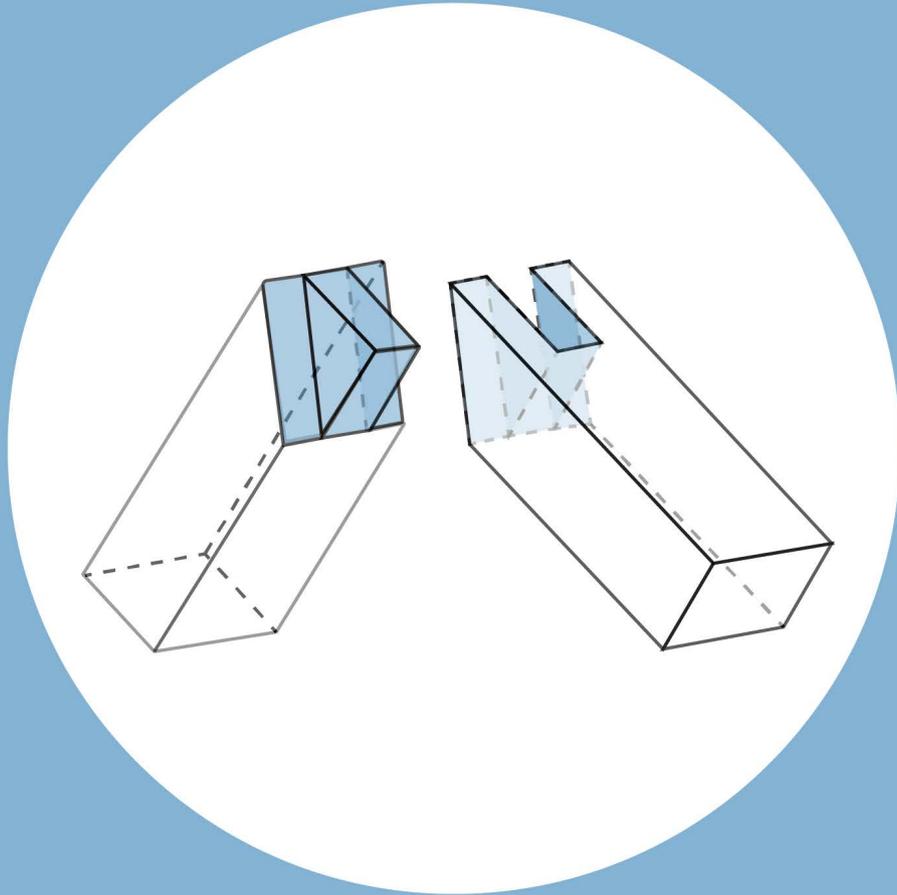
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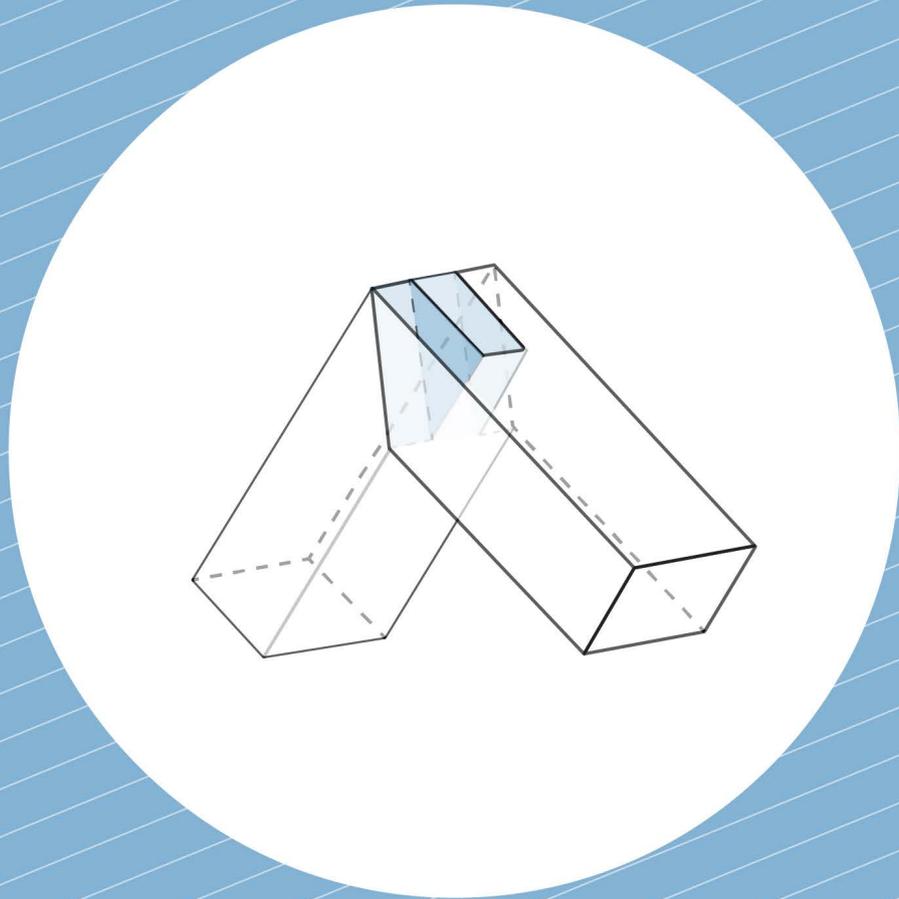
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ABOUT OUR
PROJECT

1

1.1 Background

Today, China plays an essential part in the world stage, both politically, economically and culturally.

Compared with Chinese people's rich and varied understanding of western European and American countries, westerners have very little knowledge of China. Even today, many westerners still have the impression of China in the "late Qing" period. So what is the cause of this misunderstanding?

In terms of cultural output, China has been gradually improving in the past 20 years. However, made-in-china and made-in-china products have not been accepted and understood by western countries to some extent. Most people still use terms like "poor quality", "cheap Labour" and "short life cycle" when referring to made-in-china and made-in-china products. But the products that have been labelled by western countries are flooding every corner of life.

Our defect is historical factors, at the beginning of the reform and opening up, industrial base and the industrial management level basically is a base of national capitalism and the Soviet union pattern, in the process of planned economy to market economy reform, the overall market order or the level of management level is only more than ten years, foundation is fragile, so we only have human cost advantage, the advantage of equipment depreciation.

According to the survey of people in six countries by a Chinese website, namely, the United States, the United Kingdom, France, Australia and Japan, the understanding

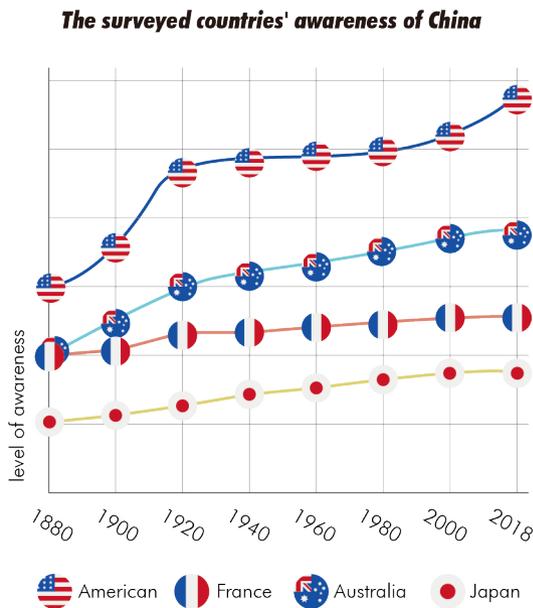


Table 1. The surveyed countries' awareness of China

Ways for foreigners to understand Chinese culture

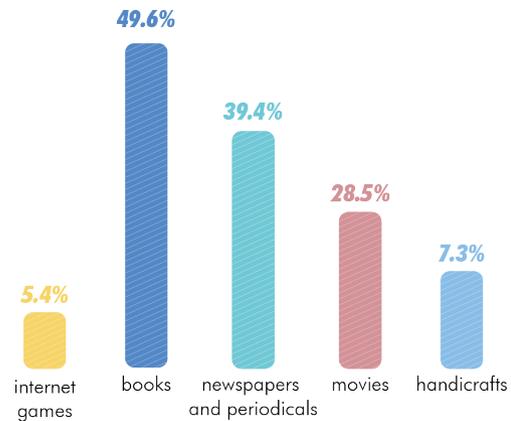


Table 2. Ways for foreigners to understand Chinese culture

of Chinese culture in these countries has improved a little in recent years (Table 1). However, there is still a particular gap between the agreement and our expectation.

In the figure above, we can see that at the beginning of the last century, the cognition of Chinese culture in various countries was unchanged and remained at a deficient level. It was not until the middle of the last century that some changes began to improve the cognition level gradually.

Foreigners' willingness to contact Chinese culture

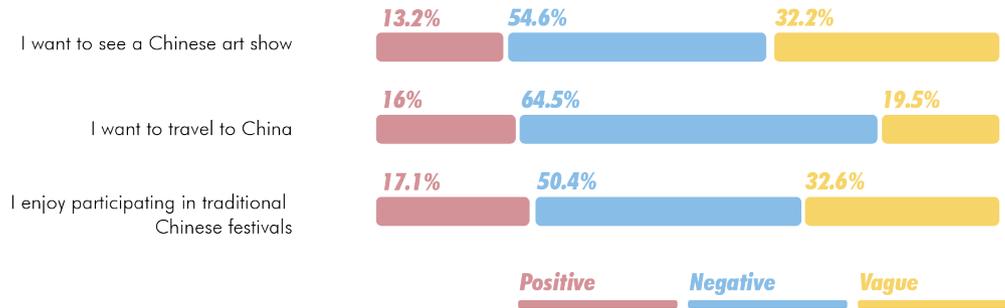


Table 3. Foreigners' willingness to contact Chinese culture

However, objectively speaking, the differences were not significant. In several countries of the above research, a data is fascinating, the question is "what kind of way to get to know you through China", (Table 2) more and more people are choosing books, newspapers and magazines and movies to understand Chinese culture, but due to the nature of religion is different, the same content by Chinese reading or watching and have been read and listen there is a big difference in essence.

In such an environment, however, it is hard to get the right information, a movie, for example, could be released in China, reflects the Chinese life for the past 50 years or more before that information. Still, for the less understanding of Chinese culture and Chinese life for people, it may be directed to some extent represents the whole of China. Or is a book, maybe in the Chinese reading is very easy to understand these hidden ironies or meaning? Still, through the understanding of the translator translated into foreign languages, books may be lost part of their original purpose or misinterpreted, coupled with the text itself is difficult to be easily understood, the contents of the book are more comfortable to be understood or not be stereotyped. However, as can be seen from the picture above (figure 1.2), more and more people learn about Chinese culture from books, newspapers, and magazines, which may be the primary reason why western countries misunderstand Chinese culture.

These misunderstandings have direct consequences, and often the results are not encouraging. As people in western countries have been accustomed to understand

Chinese culture in this way, western people are not willing to understand Chinese culture, and even a large number of people surveyed have negative attitudes towards understanding Chinese culture. We can see in the figure below (Table 3), if you'd like to go to watch the Chinese traditional culture, willing to travel to China and would like to go to the Chinese traditional culture festival, most people choose a negative attitude or vague, a small number of people choose a positive attitude. These data is not optimistic positive attitude, is less than 20% of the name.

But, in 2019 China and Italy have signed a "The Belt and Road Initiative", the more excellent the various communication of Italy and China, is not only a trade exchanges, more and more is also a cultural exchange, so, in such an environment, how to improve the western (Italy) of the people to actively understand China's culture becomes especially important. Therefore, in this paper, we hope to propose a new way to improve the western people's awareness and willingness of Chinese culture.

Next, we will introduce and analyse Chinese traditional culture or technology, and focus on explaining several most representative culture or technology. In the following content, we will investigate modern interactive modes and means, and try to combine Chinese traditional culture (technology) with modern and contemporary interactive methods and display.

1.2 Introduction to Chinese Traditional Culture

China's handicraft culture has a long history. At the same time, craftsmanship also plays an essential role in the entire Chinese culture. In the development of Chinese traditional culture, handicraft is one of the main contents running through it. Chinese crafts have an uninterrupted history of more than 10,000 years. After the development of ancient, modern and modern times, they are facing the test of transformation and regeneration.

There are many handicrafts in China, but it makes it difficult to calculate how many crafts are in total. CCTV-4¹ has produced 50 episodes of the documentary "Retaining Craftsmanship", which introduces more than 50 traditional handicrafts. China's Hunan Satellite TV² has produced more than 250 events of "The Beauty of Chinese Civilization", each of which introduces different traditional crafts or traditional culture.

Although there are a large number of them, we can classify them according to different classification methods: from the use of functions, folk handicrafts can be divided into appreciation, practical and religious, and sacrifice. Appreciation class is a folk handicraft that is placed on the desk, attached to the wall or hung in the room for people to enjoy; the practical type is a folk handicraft that has useful value in life; the religion, the sacrificial class have a colourful Buddha statue or for The crafts of the comforters. Starting from social life, folk handicrafts can be divided into practical, festive and festive, narrative and lyrics. Functional categories such as clothing, printing and dyeing, embroidery, pottery, brick carving decoration; festive celebrations such as woodcut New Year pictures, jewellery, paper-cutting, etc.; narrative and lyrics such as embroidery balls, embroidered clothing and shoes and hats, etc., as a token of love or wedding anniversary Things. According to the industry, folk handicrafts can be divided into sculptures (such as wood carving, brick carving, colour plastic,

dough plastic, blowing sugar), printing and dyeing (such as blueprinted cloth), embroidery (such as fragrant pouch, cloth tiger), weaving (bamboo and straw ware)), pottery, costumes, jewelry and woodcut New Year pictures, paper-cuts, kites, shadows, puppets, cashmere crafts, silk flowers, lanterns, lion heads, masks, folk toys, etc.

In the face of so many traditional Chinese handicrafts, we chose to start from the UNESCO's Lists of Intangible Cultural Heritage and the Register of good safeguarding practices. UNESCO has established a directory of intangible cultural heritage to ensure better protection of important intangible cultural heritage worldwide. The list was issued by the Intergovernmental Committee for the Safeguarding of Intangible Cultural Heritage, whose members draw attention to the importance of protecting intangible cultural heritage through a compilation of different human and oral and intangible wealth across the globe, which UNESCO has identified. It is an essential component and database. As of 2019, a total of 40 projects in China were included in the UNESCO Intangible Cultural Heritage List. Among them, 32 items were included in the list of representative works, seven items were listed in the urgent need list, and one subject was selected in the first practice list.

The list includes a total of 40 intangible cultural heritage projects in China, including 2 medical projects (such as Tibetan medicine), 17 artistic music projects (such as Peking Opera), 4 festival cultures projects (such as Yi New Year), and 14 handicrafts projects (such as Fujian puppetry), and 3 other projects. The 14 handicraft projects are Fujian puppetry, Chinese shadow puppetry, Wooden movable-type printing of China, Traditional Li textile techniques, Chinese seal engraving, China engraved block printing technique, Chinese calligraphy, Chinese paper-cut, Nanjing Yunjin brocade, Chinese traditional architectural craftsmanship for timber-framed structures, Regong arts (thangka and murals, crafting patchwork barbola and sculpting), Sericulture and silk craftsmanship of China, Traditional firing technology of Longquan celadon, Traditional handicrafts of making Xuan

¹ CCTV-4 is a free TV channel in China. It is one of the six CCTV channels broadcast outside China.

² Hunan Satellite TV Station is China's provincial satellite TV. It is famous for variety shows and TV series.

paper. (UNESCO, 2018) In this section, we will introduce these 14 typical Chinese traditional handicrafts.

1.2.1 Assessing traditional Chinese handicraft

These fourteen handicrafts are very important in traditional Chinese handicraft culture. They all have their own unique characteristics and existing meanings. It is difficult and complicated to define their value through simple understanding. To this end, we will evaluate them from four aspects: Innovation, Cognitive status, The current transmission status and Application. We will give each craft a score mainly through these four scores. These ratings will help us define these crafts in four directions. In the following chapters, we will also use these scores to select three handicrafts for fourteen handicrafts for in-depth investigations.

The following are the definitions of these four assessment elements, as well as the specific meaning of the different scores.

Innovation

- 1 Can the craft be combined with new technology?
- 2 Is the craft inclusive for other technologies?
- 3 Can the change process be used as a medium?
- 4 Is the craft sustainable?

Innovation:

1 point: This craftsmanship is utterly inclusive of other technological means or technological means and cannot be combined with modern new technologies.

2 point: This art of craftsmanship is not easy to connect with modern new technologies, and it is not easy to accommodate other handicraft techniques.

3 points: The arts and crafts art has absolute inclusiveness

and can be combined with other technologies or technological means to innovate, but has certain limitations.

4 points: craft art is more inclusive and has great possibilities to combine and innovate with new technologies or new technologies.

5 points: The craftsmanship is very inclusive, and it is easy to combine and innovate with new technologies or new technologies.

Application

- 1 Is the craft widely used in life?
- 2 Does the craft have certain commercial value?
- 3 Is the craft easy to be understood and mastered?
- 4 Can the craft be applied to modern design?

Application:

1 point: This craftsmanship only appeared in ancient life and was not used in modern life.

2 point: This craft is more limited in contemporary life.

3 points: This craft can be easily found in modern life.

4 points: This craft is widely used in contemporary life and has substantial commercial application value.

5 points: This handicraft is commonly used in modern life and has a robust commercial application value, and even appears widely in contemporary design products.

The current status

- 1 Are there any museums or exhibitions dedicated to this craft?
- 2 Is the handcrafted being spread well?
- 3 Does the craft have geographical limitations?
- 4 Is there a specific communication method and medium for this craft? Such as App.

The current status:

1 point: The current transmission status of the craftsmanship is poor, and there is almost no exhibition of such crafts or other communication activities.

2 point: The current transmission status of the craftsmanship is sick, and there are few exhibitions or other communication activities of this craft. This craft is only spread in a small group of people.

3 points: The current transmission status of the craftsmanship is better; there are individual exhibitions or other communication activities of this craft. This craft is spread in a large population.

4 points: The current transmission status of the craftsmanship is excellent; there are many exhibitions or other communication activities of this craft. And the state of the craftsmanship is getting better and better, with a significant upward trend.

5 points: The current transmission status of the craftsmanship is excellent; there are many exhibitions or other communication activities of this craft. There have been many ways to spread the art, including presentations, apps, websites and more for this craft.

the aircraft. Countries other than China have also been widely spread and have a high reputation.

1.2.2 Fourteen traditional Chinese handicrafts and their valuation scores

This chapter contains the introduction to the 14 traditional Chinese handicrafts included in the UNESCO Intangible Cultural Heritage List. Under the introduction of each craft, there are also the evaluation scores based on four rating elements, as well as the reasons and explanations for evaluating the scores.

Recognition

- 1 Is the craft widely recognized in China?
- 2 Is the craft widely recognized internationally?
- 3 Can the craft be understood by anyone other than a professional technician?
- 4 Does the craft appear in the textbook?

Recognition:

1 point: This craft is not known to the Chinese people.

2 point: This craft is known to a small number of people, but only to a small group of people. Most people know but don't understand what it means.

3 points: More people know the craftsmanship, but people's understanding of it is relatively simple. Only a small number of people understand its meaning comprehensively and objectively.

4 points: Many people know this craft. Most people can understand the meaning and skill of the plane. Even more, people can master the ship and use of art. Countries other than China have also been spread.

5 points: Everyone almost understands this craft, and almost everyone can master the production and use of



1.2.2.1 Traditional handicrafts of making Xuan paper

Inscribed in 2009 on the Representative List of the Intangible Cultural Heritage of Humanity. (UNESCO, 2009)

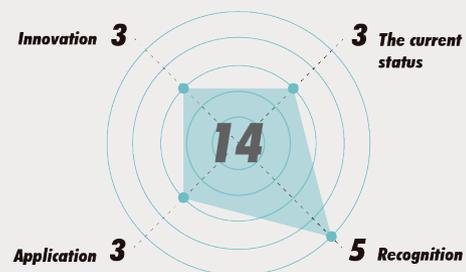
Papermaking is one of the four significant inventions in ancient China. Rice paper is an outstanding representative of traditional handmade paper. It has a sturdy, smooth surface and a soft, harsh, clean texture; it is highly resistant to wrinkles, corrosion, mites and mildew. Since the Tang Dynasty (the early eighties), it has widely used in calligraphy, painting and printing books. So far, traditional rice paper cannot be produced by machines and must be manually provided by hand.

There are 108 procedures for the production of rice paper. It has stringent requirements for water quality, raw materials, equipment and manufacturing techniques. The production culture of rice paper has had a profound impact on the Chinese national culture and played an essential role in promoting the identity of the Chinese nation and maintaining its cultural diversity.

Figure 1. Traditional handicrafts of making Xuan paper (Xuan paper making witnesses, 2016)

Table 4. Valuation of Traditional handicrafts of making Xuan paper

Valuation



Xuan paper is well known, not only in China but also in other countries, it has a high degree of recognition.

However, the production process of xuan paper is traditional and fixed, so there are some limitations in innovation and application.



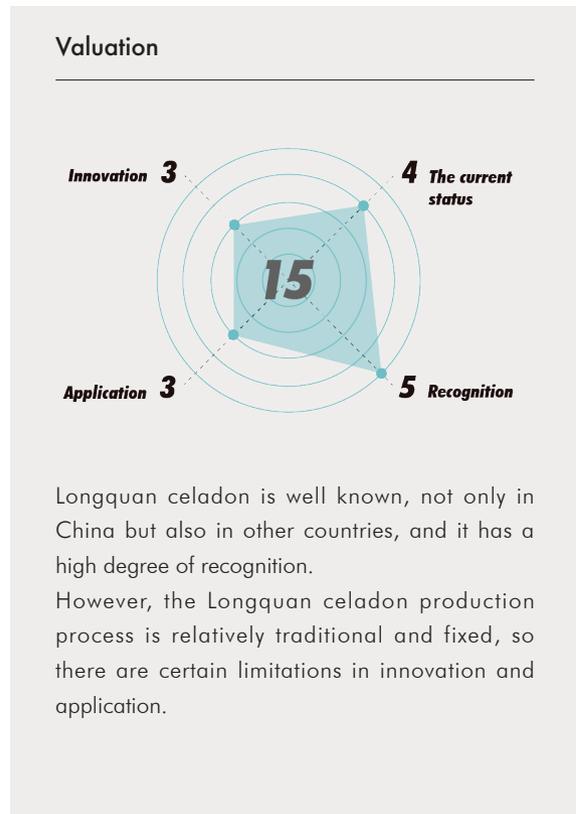
1.2.2.2 Traditional firing technology of Longquan celadon

Inscribed in 2009 on the Representative List of the Intangible Cultural Heritage of Humanity. (UNESCO, 2009i)

In the history of Chinese porcelain, celadon was the earliest porcelain produced, and its traditional firing technology has been more than 1,700 years since the 3rd century. More than 600 ancient kiln sites have been identified in China. Longquan celadon has become a recognised symbol of Chinese porcelain in history. Through commercial trade and cultural exchanges, a large number of celadon exports to many countries in the world.

Celadon is a treasure of Chinese ceramics firing process, as porcelain with a cyan glaze on its surface. Celadon is exquisite in enamel, with bright and smooth lines, dignified and straightforward style, and pure colour. It is an embodiment of ancient Chinese aesthetics: elegance, subtlety, sincerity and tranquillity.

Figure 2. Southern Spring Longquan Kiln Green Glaze Carving Lotus Porcelain Bowl (Song Dynasty Longquan Celadon Like Ice, 2019)
Table 5. Valuation of Traditional firing technology of Longquan celadon





1.2.2.3 Sericulture and silk craftsmanship of China

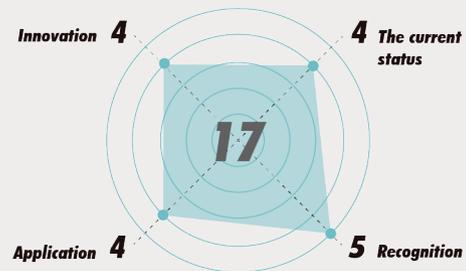
Inscribed in 2009 on the Representative List of the Intangible Cultural Heritage of Humanity. (UNESCO, 2009h)

The sericulture and silk crafts are created by China and are products with Chinese characteristics. It is an important cultural symbol of the Chinese nation. The ancient Chinese working people invented and mass-produced silk products, which opened the first large-scale commercial exchange between the East and the West in the history of the world. This is called the Silk Road. Since the Western Han Dynasty, Chinese silk has been shipped abroad in large numbers and has become a world-famous product. At that time, the road from China to the West was called "Silk Road" by Europeans, and China was also called "Silk Country." This craft involves the entire process of manufacturing: mulberry planting, silkworm breeding, silk reeling, dyeing and weaving.

Figure 3. 1740s China silk from Chinese Silk Museum (China National Silk Museum, 1740)

Table 6. Valuation of Sericulture and silk craftsmanship of China

Valuation



Silk is well known, not only in China but also in other countries, and it has a high degree of recognition.

Silk is a kind of fabric, so it has great innovation and applicability.



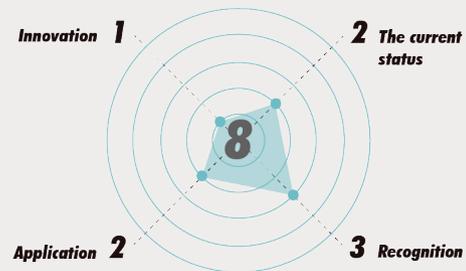
1.2.2.4 Regong arts (thangka and murals, crafting patchwork barbola and sculpting)

Inscribed in 2009 on the Representative List of the Intangible Cultural Heritage of Humanity. (UNESCO, 2009g)

Regong Arts mainly refer to Buddhism formative arts such as Thangka, mural, barbola, sculpture on which Tibetan and Tu folk handicraftsmen depend to pass on their making knowledge and manual technical skills. The content of Regong Arts consists of Tibetan Buddhism, mythical stories, epics and traditional culture. And the primary painting materials include painting cloth, painting brush, dyestuff, prepared Chinese ink, red soil, silk and glue. Thangka, mural, barbola, and sculpture are widely used in Tibetan Buddhism temples and farmers' or herdsmen's houses. Every handicraftsman has a fixed place to make material objects. Regong Arts have originated in the 13th century and stemmed mainly from Tibetan Mantang school. After they were introduced into Regong area, Regong Arts have formed an critical distinctive school of Tibetan Buddhism arts. Regong Arts have various forms with unique features.

Figure 4. 18th century Thangka art (18th century Thangka art, 1700)
Table 7. Valuation of Regong arts

Valuation



The Thangka art in Regong art is highly transmissible. But people lack understanding of other elements of the Cantonese art.

Thangka art has high requirements for craftsmanship, which also weakens its innovation and application.



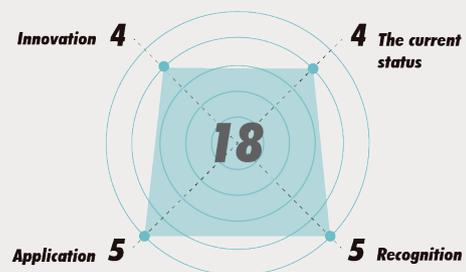
1.2.2.5 Chinese traditional architectural craftsmanship for timber-framed structures

Inscribed in 2009 on the Representative List of the Intangible Cultural Heritage of Humanity. (UNESCO, 2009e)

Traditional Chinese architecture features layout, space, structure, building materials and decorative arts, which are different from the architectural features of other countries. There are many types of ancient Chinese architecture, including palaces, temples, pagodas, houses and garden buildings. The process uses wood as the primary building material, the structure of mortise and tenon as the main connecting structure. Chinese traditional architecture affects people in not only aesthetics, but also the aesthetics of architecture and space created by it reflects the Chinese understanding of nature, hierarchy and interpersonal relationships. In particular, the traditional art of mortise and tenon also affects the Chinese people's code of conduct, aesthetic inclination and character. It is the embodiment of ancient technical wisdom and the climax of Chinese craftsmanship. Chinese traditional architectural art has been inherited for more than 7,000 years and has an impact and application throughout Asia.

Figure 5. Chinese forbidden city (Forbidden City in the Snow, 2015)
Table 8. Valuation of Chinese traditional architectural craftsmanship for timber-framed structures

Valuation



Chinese traditional architecture is widely seen in people's lives, so it is highly recognized. In recent years, the popularity of Chinese traditional wood-frame construction technology in China has increased significantly. This also promotes the innovation, applicability and degree of dissemination of this process technology.



1.2.2.6 Nanjing Yunjin brocade

Inscribed in 2009 on the Representative List of the Intangible Cultural Heritage of Humanity. (UNESCO, 2009f)

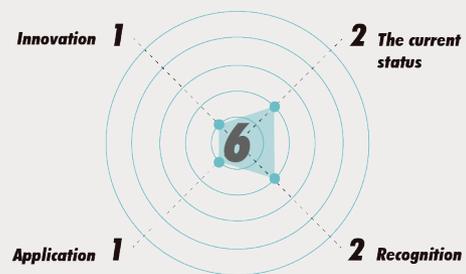
Nanjing Yunjin brocade is a traditional Chinese silk craft, and it is known as “every inch of brocade is gold”. Its history can be traced back to 417 AD (the 13th year of Yixi in the Eastern Jin Dynasty). Nanjing Yunjin brocade has a history of 1,600 years. Until now, this traditional hand-weaving technique, which is woven by human memory, cannot be replaced by modern machines.

Nanjing Yunjin brocade is named for its colour and texture. This technology inherits the beautiful traditions of silk textile technology of the past. It combines the valuable experience of various silk weaving techniques to reach the peak of the silk weaving process. It is known as the “King of the Champion”. It represents one of the highest achievements of Chinese silk weaving. It is characterised by exquisite materials, fine weaving, lovely patterns, beautiful brocade and elegant style. Nanjing Yunjin brocade condenses the essence of Chinese silk weaving skills and is a unique representative of Chinese silk culture.

Figure 6. Nanjing Yunjin brocade (Nanjing Yunjin brocade in production, 2015)

Table 9. Valuation of Nanjing Yunjin brocade

Valuation



Nanjing Yunjin brocade has strict requirements on process technology and materials, which makes its manufacturing cost and storage conditions very high. This also weakens the innovation and applicability of this craft.

Nanjing Yunjin brocade mainly appeared in Nanjing and appeared less in other cities. This weakens its spread and the extent of its exhibition.



1.2.2.7 Chinese paper-cut

Inscribed in 2009 on the Representative List of the Intangible Cultural Heritage of Humanity. (UNESCO, 2009d)

Chinese paper-cutting is a folk art that uses scissors or knives to cut patterns on paper for decorating life or cooperating with other folk activities. Paper-cutting in China is a form of folk art with a long history and a wide spread. Paper-cutting has a broad mass base and blends with the social life of the people of all ethnic groups. It is an essential part of various folk activities. Paper-cutting exists in all parts of China and different ethnic groups and is an indispensable popular art in daily life.

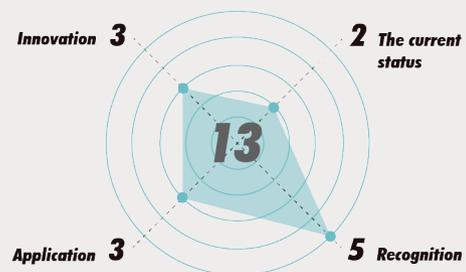
The language of folk paper-cutting is not merely to depict the image of an item but to express feelings and hope by drawing some things. People through the paper-cutting pictures of the customary, to pin people's longing for a better life, the expectations of hopeful happiness. For example, people pray for food and clothing, prosperity, longevity, and good luck. This pure desire will be conveyed through paper-cutting.

Figure 7. Paper-cut of Menshen¹ (paper-cut of Menshen, 2016)

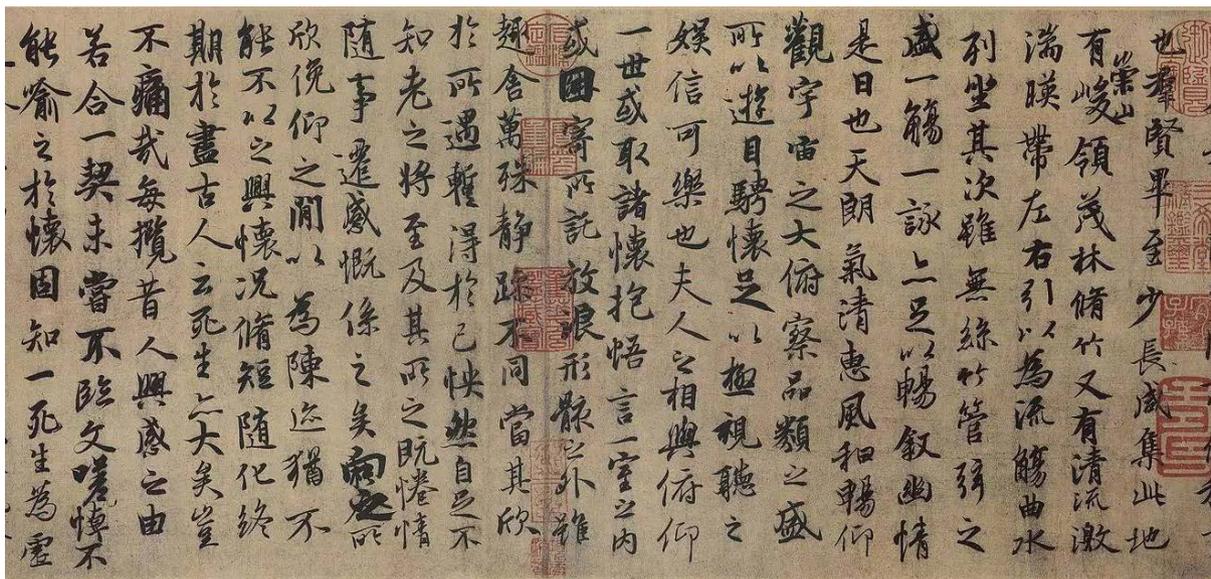
Table 10. Valuation of Chinese paper-cut

¹ Menshen is the god of the guardian's door in Chinese folklore.

Valuation



Chinese paper-cutting is widely seen in everyday life, so it has a high level of recognition. But for this reason, there are few professional exhibitions on the art of paper-cutting.



1.2.2.8 Chinese calligraphy

Inscribed in 2009 on the Representative List of the Intangible Cultural Heritage of Humanity. (UNESCO, 2009c)

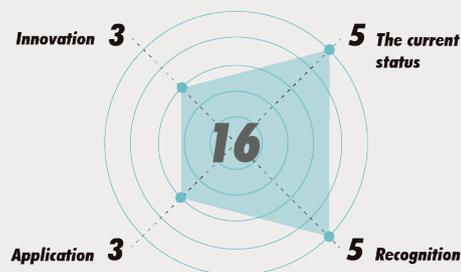
Chinese calligraphy is the writing art of Chinese characters. From the perspective of relying on Chinese characters, Chinese calligraphy is a unique visual art. Still, this uniqueness does not prevent people who do not know Chinese characters from enjoying Chinese calligraphy. Although its original intention is to write and communicate, Chinese calligraphy is not only a simple communication tool but also incorporates artistic elements. This kind of creative part makes the art of calligraphy still valued in this era of electronic office, and plays a position that cannot be underestimated. Especially in ancient times, Chinese calligraphy has a perfect life foundation. Many excellent calligraphy works exist in the form of letters, poetry manuscripts, inscriptions, plaques, interior decorations, etc. Most of these works have written content and calligraphy. The characteristics of artistic beauty complement each other.

Figure 8. Lanting Xu¹ (LanTing Xu, 2016)

Table 11. Valuation of Chinese paper-cut

¹ Lanting Xu, is one of the most famous Chinese calligraphy work written by calligrapher Wang Xizhi (303 – 361) from the East Jin Dynasty (317 – 420).

Valuation



Chinese calligraphy has an irreplaceable position in China. It is widely spread and recognized at different ages. But as a two-dimensional art, it is less innovative and applicable.



1.2.2.9 China engraved block printing technique

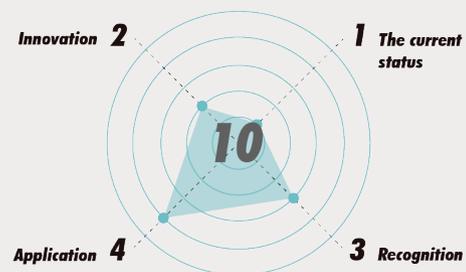
Inscribed in 2009 on the Representative List of the Intangible Cultural Heritage of Humanity. (UNESCO, 2009b)

China engraved block printing technique is an essential invention of the ancient Chinese. It is a technique for engraving images and printing on the plates. Its development in China has gone through several stages, from seals, inkstones to engravings, to movable type. For carving and printing, the wood is generally made of fine and solid wood, such as jujube and pear wood. Then saw the forest into a piece of timber, write the words to be printed on the thin paper, and put it on the wooden board. Then, according to the stroke of each word, use a knife to engrave into a pen, so that each word The strokes are highlighted on the board. After the wood board is carved, you can print the book. The engraving was invented in the Tang Dynasty and was widely used in the middle and late Tang Dynasty. As of today, there are still many workshops that continue to use this craft.

Figure 9. China engraved block printing technique (Mochi cloth shoes engraving printing, 2016)

Table 12. Valuation of China engraved block printing technique

Valuation



The engraved block printing technique is still used in modern life, so it is more applicable. But the lack of expertise in the engraved block printing technique and its technical methods



1.2.2.10 Chinese seal engraving

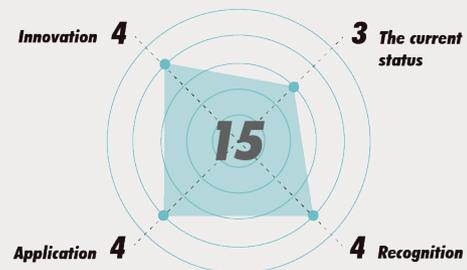
Inscribed in 2009 on the Representative List of the Intangible Cultural Heritage of Humanity. (UNESCO, 2009a)

Like calligraphy, the art of seal engraving is also an art of expression of Chinese characters. All nations of the world have their own words, but the Chinese have sublimated practical writing into artistic activities. The sketch is first drawn on paper and then engraved on the stone with a knife. In addition to mastering traditional calligraphy, the art of engraving requires a high degree of skill. Because the artist needs to work on a small surface area, the thickness of each line is essential. When the seal was invented, it was mainly used as a signature or a logo. The art of seal engraving has evolved from the application of the original practical seal. It has gradually become the art of seal engraving with literati artists as the main body of creation. It has been efficient and artistic in the evolution of more than two thousand years. The combination and unity of the Chinese character culture in the square of such a seal are presented in a variety of beautiful performances.

Figure 10. Heirloom Seal of queen of the Han Dynasty (Queen Jade Seal, 2019)

Table 13. Valuation of Chinese seal engraving

Valuation



Seal engraving is still used in modern life, so it is more applicable. It frequently appears in art paintings, especially since it often appears with Chinese calligraphy works, so it has a high degree of applicability.



1.2.2.11 Traditional Li textile techniques

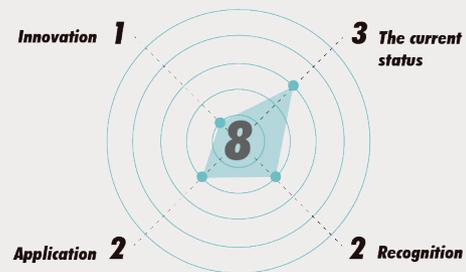
Inscribed in 2009 on the List of Intangible Cultural Heritage in Need of Urgent Safeguarding. (UNESCO, 2009k)

Li nationality is one of the first ethnic groups in China to master textile technology. As early as the Yin and Zhou dynasties before 3000 years ago, Li textile technology has emerged. In the Song and Yuan Dynasties, the Li people's cotton spinning technology and cotton textile crafts have reached a very high level. The Li traditional dyeing and weaving techniques include four processes of spinning, dyeing, weaving and embroidering. Dyeing, Li traditional dyes are three kinds of vegetable dyes, animal dyes and mineral dyes. Weaving, weaving with a particular conventional machine. Embroidery, single-sided embroidery and double-sided embroidery. The technique of embroidery can be divided into three levels according to the stitching method, the embroidering method and the fabric, and the embroidery method, the colour and the pattern are combined into one. Due to different living habits, cultural economy, production environment and other factors, the brocade patterns are also different. For a long time, Li women have used their imagination to create a vibrant art pattern of the traditional Li textile techniques.

Figure 11. Li women are spinning (Li weaving, 2017)

Table 14. Valuation of Traditional Li textile techniques

Valuation



Traditional Li textile is less common in modern life and even more difficult to reach. Because of the low degree of transmission, the level of innovation is also low.



1.2.2.12 Wooden movable-type printing of China

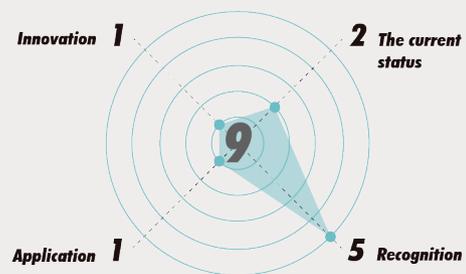
Inscribed in 2010 on the List of Intangible Cultural Heritage in Need of Urgent Safeguarding. (UNESCO, 2010)

Movable-type printing is one of the world's oldest printing techniques. The ancient Chinese working people invented it through long-term practice and research. Lines make a single text model, then sort the individual words according to the manuscript, arrange them in the dial, apply ink, and finally print. After printing, you can take out the model of a single word and wait for it to continue using it the next time you write.

The invention of movable type printing was a great technological revolution in the history of the page. The transportable type printing technique was invented in the Northern Song Dynasty (1041 - 1048). In the middle of the Ming Dynasty, the wooden movable-type printing was widely used in Nanjing, Wuxi and Suzhou.

Figure 12. Wooden movable-type printing (Time stamp, 2019)
Table 15. Valuation of Wooden movable-type printing of China

Valuation



Wooden movable-type printing is defined in the school's textbook as China's "four major inventions", so it has a high degree of recognition. But there are very few practical applications. The level of innovation in life, technology, and technology is also low.



1.2.2.13 Chinese shadow puppetry

Inscribed in 2011 on the Representative List of the Intangible Cultural Heritage of Humanity. (UNESCO, 2011)

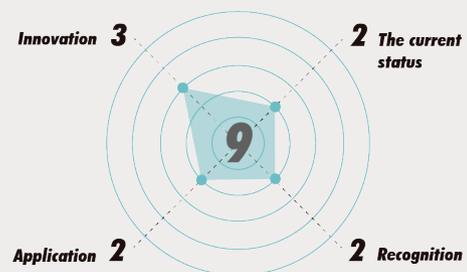
Chinese shadow puppetry is a form of folk drama in which a silhouette of a character made of animal skin or cardboard is used to perform a story. During the performance, the artists behind the white curtains, while manipulating the shadow puppetry, tell the story with local popular tunes, accompanied by percussion instruments and strings, and have a strong local flavour. Its popularity is extensive, and a variety of shadow play scenes are formed due to the different styles played in different places. At the same time, Chinese shadow play also disseminates information on cultural history, social beliefs, oral traditions and local customs.

The shadow play is an ancient Chinese traditional art. According to historical records, the shadow play began in the Western Han Dynasty and flourished in the Tang Dynasty. It flourished in the Qing Dynasty and the Yuan Dynasty.

Figure 13. A craftsman is performing a shadow puppetry (Lu Jinzhang, 2019)

Table 16. Valuation of Chinese shadow puppetry

Valuation



Chinese shadow puppetry has a higher degree of recognition. However, few people understand the production process and technology of Chinese shadow puppetry. The corresponding exhibitions are relatively few.



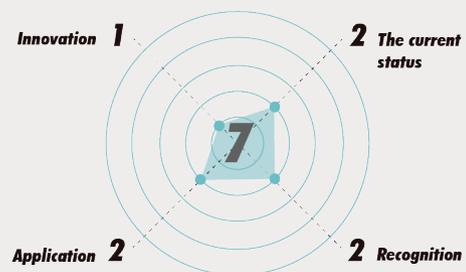
1.2.2.14 Fujian puppetry

Selected in 2012 on the Register of Good Safeguarding Practices. (UNESCO, 2012)

Fujian puppets are outstanding representatives of Chinese performing arts. It consists mainly of string-pulled puppetry and hand puppetry. This performing arts began to spread in Quanzhou, Zhangzhou and surrounding areas in the 10th century. In its history, it not only accumulated a lot of traditional drama and singing but also developed luxurious and exquisite performance skills, unique performance system and excellent craftsmanship in the puppet style. Since the 10th century AD, it has been widely spread in Quanzhou, Zhangzhou and surrounding areas. Its performance techniques are exquisite, traditional repertoire and music are rich in vocals, and the idol sculpture art is lovely, forming a complete performance system and becoming a form of performing arts cherished by the local community.

Figure 14. Fujian Puppetry (Historical origins of puppet show, 2014)
Table 17. Valuation of Fujian puppetry

Valuation



Fujian puppetry is highly disseminated in Fujian Province but less in other cities and provinces. There are also very few innovative products and techniques that still retain the characteristics of Fujian puppetry.

1.2.3 Summary of the valuation scores

According to the above table, we get the evaluation scores of each traditional handicraft, in order (scores are ranked from high to low): Chinese traditional architectural craftsmanship for timber-framed structures: 18 points; Sericulture and silk craftsmanship of China: 17 points; Chinese calligraphy: 16 points; Traditional firing technology of Longquan celadon: 15 points; Chinese seal engraving: 15 points; Traditional handicrafts of making Xuan paper: 14 points; China engraved block printing technique: 10 points; Wooden movable-type printing of China: 9 points; Chinese shadow puppetry: 9 points; Regong arts (thangka and murals, crafting patchwork barbola and sculpting): 8 points; Traditional Li textile techniques: 8 points; Fujian puppetry: 7 points; Nanjing Yunjin brocade: 6 points. (Table 18)

Although the main purpose of this article is to promote and spread the traditional Chinese handicraft culture, if there is no promotion and dissemination of the primary and secondary points, it will lead to a more weakening of communication effects and efficiency. In the fourteen traditional handicrafts, we don't want to only pay attention to crafts with the top scoring. However, we hope to select a craftsmanship to continue our project through more objective research and comparison.

With the above intent, we selected three handicrafts with the highest score, medium score and lowest score among the fourteen handicrafts for further investigation. Not only a deeper understanding of the craft itself, but also a more

Ranking of Valuation Scores

18	Chinese traditional architectural craftsmanship for timber-framed structures
17	Sericulture and silk craftsmanship of China
16	Chinese calligraphy
15	Traditional firing technology of Longquan celadon
15	Chinese seal engraving
14	Traditional handicrafts of making Xuan paper
13	Chinese paper-cut
10	China engraved block printing technique
9	Wooden movable-type printing of China
9	Chinese shadow puppetry
8	Regong arts (thangka and murals, crafting patchwork barbola and sculpting)
8	Traditional Li textile techniques
7	Fujian puppetry
6	Nanjing Yunjin brocade

Table 18. Ranking of valuation scores

in-depth investigation and research on their dissemination status and communication trends. According to our selection rules, these three crafts are: Chinese traditional architectural craftsmanship for timber-framed structures, Chinese paper-cut, Nanjing Yunjin brocade.

1.3 Chinese traditional handicraft analysis

In the traditional Chinese handicrafts listed in the list of 14 UNESCO's the Lists of Intangible Cultural Heritage and the Register of good safeguarding practices, we compare the

current distribution, development and presentation methods. We have selected three traditional Chinese handicrafts for more in-depth research.



Figure 15. Chinese Paper-cut (Jiaxing Daily, 2018)

1.3.1 Chinese Paper-cut Art

Present throughout China and in various ethnic groups, paper-cut (Figure 15) is a popular art integral to everyday lives.

In the early days of the art of paper-cutting, it was mainly produced and passed on by women. But with the development, the art of paper-cutting spreads among more and more people. The art of paper-cutting requires more cutting and sculpting techniques for carving knives or scissors. With the development of the times, the art of paper-cutting began to embrace more creative methods, including the use of more and more modern technology. As an essential part of the social life of all ethnic groups in China, paper-cutting expresses the moral principles, philosophy and aesthetic ideals of its exponents. The content of paper-cutting art depends not only on the artistic style of

different regions (each province or each nation has different representative elements) but also on the purpose of using paper-cutting. Paper-cut can be used for interior decoration, celebrations, or festivals and event celebrations.

In China, the art of paper-cutting is almost infiltrated by everyone's life. If you live in China, you will find the shadow of paper-cut or the art of paper-cutting in every corner. Whether it is daily life or a significant festival celebration, the paper-cutting technique is being widely used.

Although the elements of paper-cutting can be seen throughout China, here we mainly analyse the main production areas of paper-cutting. The paper-cut features are mostly distributed in the eastern part of China, the coastal regions in the south, and some areas where ethnic minorities are concentrated (such as Xinjiang Autonomous Region and Yunnan Province).

China's paper-cut culture distribution map



Table 19. China's paper-cut culture distribution map

· Geographic location and range of the element (Table 19):

Famous paper-cut culture city: Ansai County, Shaanxi Province; Yuxian County, Hebei Province; Fengning Manchu Autonomous County, Hebei Province; Zhongyang County, Shanxi Province; Yangzhou City, Jiangsu Province; Yueqing

City, Zhejiang Province; Jinzhou City, Liaoning Province; Luxi City, Yunnan Province.

Paper-cutting association that participated in the application for the Intangible Cultural Heritage of Humanity: Shaanxi Folk Paper-cut Institute, Shanxi Paper-cut Artist Association,

Inner Mongolia Paper-cut Association, Ningxia Paper-cut Association, Shanghai Paper-cut Institute, Shandong Paper-cut Institute, Xinjiang Folk Paper-cut Institute, Heilongjiang Paper-cut Institute, Henan Paper-cut Association, Changbaishan Manchu Paper-cut Institute, Hubei Paper-cut Association, Guangzhou Paper-cut Association and Fuzhou Paper-cut Institute.

Chinese paper-cut, a traditional handiwork created by cutting patterns on paper via scissors or graver, has been a time-honoured folk art piece for decorating purpose on festivals or coordinating with various folk-custom activities. As a folk art form adored and practised by Chinese folk, Chinese paper-cut has been developed for more than 1,500 years with its fabrication skills and sculpts being preserved to these days.

Chinese paper-cut comprises two classifications including "paper-cutting" and "paper-engraving". The former relies on manual cutting and often produces one art piece in one process; the latter relies on engraving with a graver and often produces multiple art pieces in one process. The Chinese paper-cut art pieces have a unified colour or various colours. Besides, mosaic or setting-off skills are adopted to enrich the colour effect of Chinese paper-cut art pieces.

Chinese paper-cutting art is widely used in people's daily life and folk festivals. Especially in folk activities, different patterns imply different meanings. For example, the pomegranate symbolises fertility and future generations, dragon and phoenix symbolise love and marriage, and bamboo symbolises luck and good character of examination, plum symbolises tenacity Pull out the temperament. Sometimes Chinese characters appear on paper-cut works. The most common is that during the Chinese New Year, people will put a paper-cut with the word "福" on the window. The word "福" here symbolises a happy life and entrusts people's desire for a better experience. Paper-cutting art is a kind of narrative technique, and sometimes its theme involves folk beliefs, myths and historical stories. The bold and vivid carvings in Chinese paper-cuts fully reflect the Chinese people's romantic thoughts and wild imagination.

Due to the vast territory and a considerable difference in

folk customs in the northern and southern regions of China (Table 20), there are diversified styles in Chinese paper-cut. Comparatively speaking, the paper-cut art pieces in North China are characterised by bold and crude artistic styles while those in South China are fine and delicate.

The rural area begins to learn the traditional skills of paper-cut. The paper-cut skills are mainly inebriated from mothers to daughters, mothers-in-law to daughters-in-law as well as among neighbours and villages. Under the guidance of mothers or older women, young girls gradually master the paper-cutting skills and sculpt procedures by imitating the conventional patterns. Later, when they get married, they would pass the traditional designs and the new ones created by themselves down to the younger generations. In the countryside of China, the paper-cutting skills and art pieces have been regarded as an essential means for evaluating the skills and virtues of women. The outstanding female paper-cut artists would often win respect and admiration from their folks, and the women in the rural area have always been proud of paper-cutting skills. From the 20th century onwards, some male paper-cut artists, such as Wang Laoshang, Zhang Yongshou and Chen Chaofen, also came on stage. They, together with the outstanding female paper-cut artists, make an invaluable contribution to the creation of paper-cut art pieces that both inherit the ordinary skills and adapt to the new social need in contemporary time.

Intertwining with the social life of Chinese people of all ethnic groups, Chinese paper-cut has become a significant component of Chinese folk activities and a popular folk art form in China. The Chinese folks often express their social understandings, moral principles, life ideals and aesthetic pursuit in paper-cut. They have always identified with and invested great endeavour in maintaining the social functions and values of paper-cut such as cognition, civilisation, expression, amusement and communication. The most ancient and primitive philosophical thinking, belief in life and styles of sculpting are all kept in Chinese paper-cut. The representative sculpts such as "snake and hare", "baby with twisted bun" and "deer head flower" have marvelled a significant number of people by their cultural continuity and preservation of cultural information that has been carried on for thousands of years.

China's existing major representative paper-cut culture area and their distribution



The following Chinese paper-cuts were approved entering the List for Protection of National Intangible Cultural Heritage by the State Council of the People's Republic of China in May 2005, and the list is under the responsibility of the Department of Social Culture & Library of the Ministry of Culture of the People's Republic of China.

- | | | | |
|---|---|---|--|
| 1 | Ansai Paper-cuts
(Ansai County, Shaanxi Province) | 5 | Yangzhou Paper-cuts
(Yangzhou City, Jiangsu Province) |
| 2 | Yuxian Paper-cuts
(Yuxian County, Hebei Province) | 6 | Yueqing Fine Paper-cuts
(Yueqing City, Zhejiang Province) |
| 3 | Fengning Manchu Paper-cuts
(Fengning Manchu Autonomous County, Hebei Province) | 8 | Dai Paper-cuts
(Luxi City, Yunnan Province) |
| 4 | Zhongyang Paper-cuts
(Zhongyang County, Shanxi Province) | 7 | Manchu Paper-cuts
(Jinzhou City, Liaoning Province) |

Table 20. China's existing major representative paper-cut culture area and their distribution

Currently, Chinese paper-cut witnesses unprecedented thrive. The representative paper-cut inheritors from various regions of China have established many associations, societies and institutes. What is more, under the support from local governments and cultural administrations, the representative paper-cut inheritors have actively held paper-cut training classes and exhibitions and, at the same time, published books related to paper-cut, thus carrying forward

the heritage of Chinese paper-cut.

The following Chinese paper-cuts were approved entering the List for Protection of National Intangible Cultural Heritage by the State Council of the People's Republic of China in May 2005, and the list is under the responsibility of the Department of Social Culture & Library of the Ministry of Culture of the People's Republic of China.



Figure 16. Chinese traditional mortise and tenon (Ming style Burmese rosewood chair, 2019)

1.3.2 Mortise and tenon

The intangible cultural heritage project first proposed and included in UNESCO is Chinese Traditional architectural craftsmanship.

Traditional wood structure creation techniques are ancient conventional craftsmanship. Chinese traditional architecture is a building system based on wood frame, with soil, wood, brick, tile and stone as the primary building materials. Its building structure mainly uses the structure of mortise

and tenon(Figure 16). Chinese artisans have accumulated rich technical experience in the process of thousands of years of construction, in the rational selection of materials, the determination of structural methods, the trade-offs and calculations of modular dimensions, the processing and fabrication of components, the treatment of joints and details and construction. There are unique and systematic methods or techniques in terms of installation, as well as related taboos and operational rituals. This kind of construction technique has been passed down from generation to generation in the way of “teaching

and teaching” between masters and apprentices.

Since the late 19th century, the construction methods of western architecture were imported into China, and Chinese traditional architectural craftsmanship for timber-framed structures has been impacted dramatically with its application scope and the number of practitioners decreasing. Some traditional architectural craftsmanship has perished or been on the brink of disappearance. Nowadays it is mainly employed in the construction of temples and palaces with classic style and in repairing the ancient buildings.

Chinese traditional architectural craftsmanship for timber-framed structures is a historical choice of the Chinese people in the interaction of specific natural environment, structural materials, technical level and social ideology. Chinese inhabitants live in the structures and space built by the traditional fundamental craftsmanship generation by generation, and it has become a kind of symbol and cultural identification for the Chinese people.

The components of the timber-framed structure are so designed that they can bear the load with ingenious joinery, reflecting the wisdom of ancient technology. Through the architecture adopting the craftsmanship, we can gain some understanding of old Chinese’s view of the universe, the hierarchical system and interpersonal relationships in traditional Chinese society. Having lasted for seven millennia and been applied all over China as well as Eastern Asia such as Japan and Korea, this craftsmanship serves to enhance cultural identity and relationships between different peoples. Not only is it the representative of ancient oriental

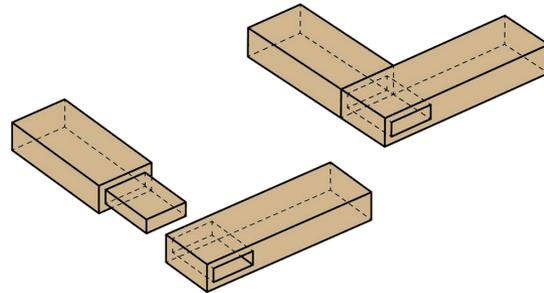


Figure 17-A: The list of several common structures of mortise and tenon

Through tenon - Tenon passes through the mortise completely. The tenon is clearly visible on the back of the wood.

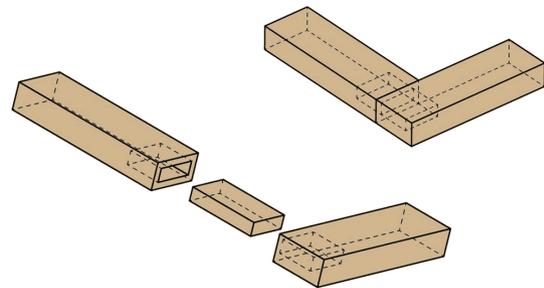


Figure 17-B: The list of several common structures of mortise and tenon

Loose tenon - Tenon is a part of independence. There are two mortises in the structure

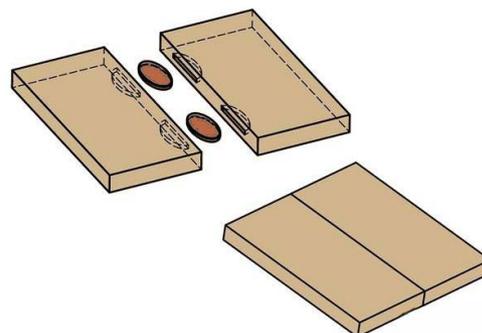


Figure 17-C: The list of several common structures of mortise and tenon

Biscuit tenon - Tenon is a round piece of wood like a cookie (sometimes it will be another shape)

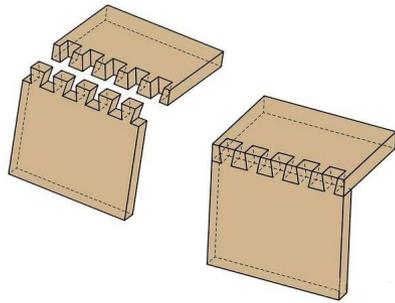


Figure 17-D. The list of several common structures of mortise and tenon

Tusk tenon - The shape between tenon and mortise is like a sawtooth shape.

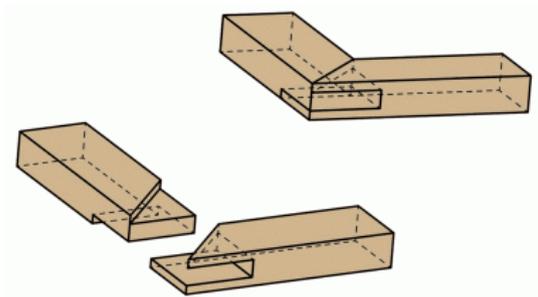


Figure 17-E. The list of several common structures of mortise and tenon

Tenon and mortise joint with mitered face.

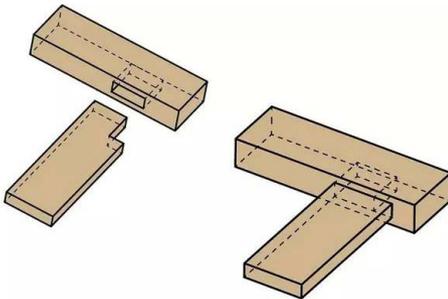


Figure 17-F. The list of several common structures of mortise and tenon

Haunched tenon and mortise joint

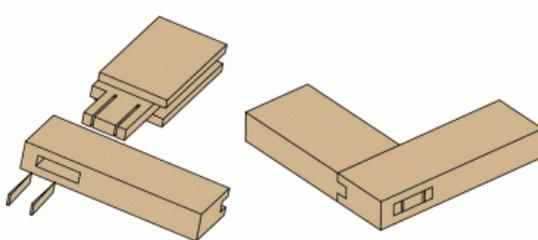


Figure 17-G. The list of several common structures of mortise and tenon

Wedged through tenon and mortise joint

architectural craftsmanship but also the precious intangible cultural heritage for all humankind.

In Chinese Traditional architectural craftsmanship, Mortise and tenon is an indispensable part.

The structure of mortise and tenon is the main structural form of ancient Chinese architecture, furniture and other instruments. It is a connection method that combines concave and convex parts on two components. The protruding portion is called tenon; the hollow part is called mortise. This structure is characterised in that no nails are used on the object, and the structure can be connected and fixed by using the fabric. If properly used, the two wooden structures can be tightly fastened to the extent that they are seamless. It is the essential skill that ancient carpenters must possess. The level of craftsmanship and craftsmanship can be reflected through the structure of the cymbal. In addition to its application in buildings, the structure of enamel can also be seen in traditional Chinese furniture.

When the structure of mortise and tenon is applied to the history of furniture, the construction of mortise and tenon is called the "soul" of mahogany furniture. The ridges and recessed ridges protruding from the wooden members can be joined together by simple occlusion. Due to the different shapes of the connecting members, a variety of combinations are derived from achieving the perfect unity between the function and structure of the furniture.

Here we list several common structures of mortise and tenon: (Figure 17.)(Mortise and tenon woodworking joints, 2018)



Figure 18. The tapestry of clouds and dragons - Early Qing Dynasty

1.3.3 Nanjing Yunjin brocade

In succession of the royal weaving tradition of China, the Nanjing Yunjin brocade weaving technology embodies the highest level of Chinese weaving techniques. By the adoption of such core technology as "Passing the warp yarn and splitting the weft yarn" manually operated by two workers respectively positioned on the upper and lower parts of a complicated structured large loom, weaving the elegant and noble textile fabric like Emperor's robe with materials such as silk yarn, golden yarn and peacock feather yarn.

The weaving technique of Nanjing Yunjin brocade has a

complete system and is thus entitled to be the witness of the remarkable creativity of human beings. Today, the Nanjing Yunjin brocade (Figure 18), named for its splendour like the cloud's resplendence and as the classic of the Chinese traditional weaving technique, is still used for the weaving of high-end textile fabrics and popular among the mass of the people.

The birthplace and production centre of Nanjing Yunjin brocade is like its name, all in Nanjing, Jiangsu Province. They are primarily concentrated in Jianye, Baixia and Xuanwu District of Nanjiang city. The most representative heritage site is located at Jianye District, Nanjing, China.

Geographic location and range of Nanjing Yunjin brocade

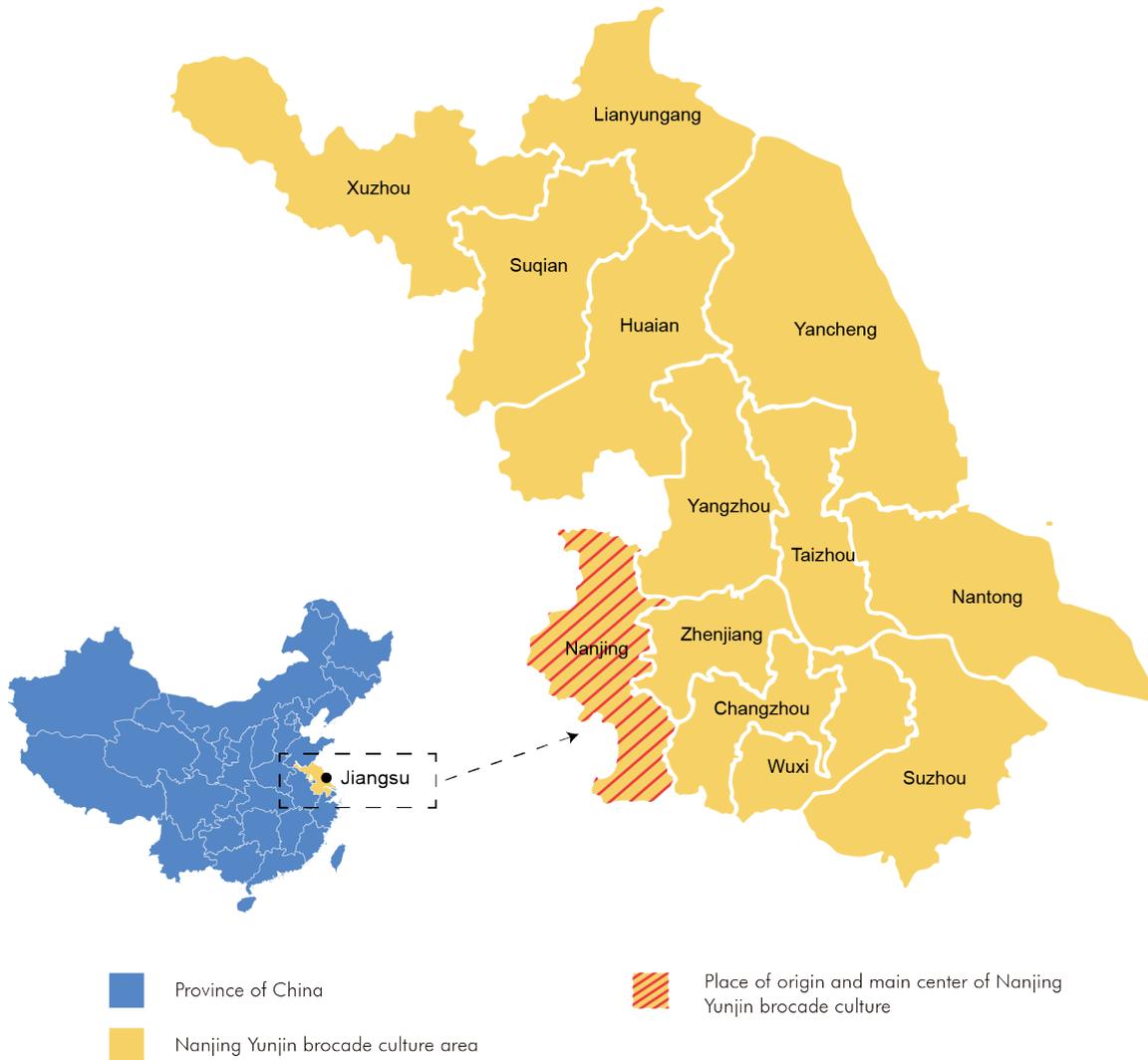


Table 21. Geographic location and range of Nanjing Yunjin brocade

Geographic location and range of the element (Table 21):

Jianye, Baixia and Xuanwu District, Nanjiang city, Jiangsu province.

The most representative heritage site is located at Jianye District, Nanjing, China.

Nanjing Yunjin Brocade technique is a traditional handicraft through which exquisite and luxurious fabric is woven on large-scale wooden looms by using valuable materials like silk thread, gold thread, and peacock feather thread and core skills of “Tongjingduanwei” and “Wahuapanzhi”. It has a history of over 1500 years. The handicraft is brought into full play in the weaving of royal fabrics such as the dragon

robe and crown costume, representing the top level of China's brocade craftsmanship.

Nanjing Yunjin Brocade handicraft system is composed of over a hundred procedures including material preparation, pattern design, jacquard card forming, loom manufacturing and weaving etc. The content for Nanjing Yunjin Brocade is carefully selected. It is made by refining silk thread, dying, rolling weft, loading gold flake and entwisting round gold and peacock feather thread and processed in particular methods with particular tools. Not only image, implication and colour match but also the structure of fabric has to be taken into consideration to draw symbolic "pattern draft" during pattern design. Based on this "pattern draft", a "jacquard card" will be composed by combing all messages with silk thread for weaving. This is the crucial procedure of the handicraft called "Tiaohuajieben" uniquely created by the brocade craftsmen. As for "loom manufacturing", the warp shall be installed correctly according to different requirements on location and pattern based on different varieties and specifications. Finally, the weaving procedures including "passing warp thread and cutting weft thread" and other weaving of various structures will be done by the craftsmen operating a large-scale wooden loom which is 5.6m long, 4m high, and 1.4m wide. The craftsmen have accumulated a lot of experience and composed the technical specifications and operation gist into mnemonic ballads. It is an art scene when they are cooperating singing and weaving. Nanjing Yunjin Brocade is distinguished from other weaving techniques in that textile fabric in different colours and patterns can be woven from the same jacquard card, which is irreplaceable by modern weaving machines even today.

Nanjing is located in the middle and lower reaches of the Yangtze River. With a humid climate, it abounds in silk, dye plants and gold thread, and the water from Qinhuai River is suitable for dyeing. Since "Douchang Brocade Bureau" was established in Nanjing by the East-Jin government in 420 A.D., the manufacturing of Nanjing Yunjin Brocade was under the management of the government. "Dong Weaving and Dyeing Bureau" and "Xi Weaving and Dyeing Bureau" were established in Nanjing in the Yuan Dynasty in 1280. "Nei Weaving and Dyeing Bureau", "Divine Silk Hall" and "Loom Supply Room" were established in Nanjing

by the Ming government in 1368. "Jiangning Weaving Bureau" was established in Nanjing in 1663 by the Qing government to provide Yunjin brocade exclusively to the royal family and government officials. It not only served the royal family but also played an essential role in reinforcing political management, accelerating national unification and cultural exchange through largess and gift presenting.

Nanjing Yunjin Brocade Research Institute, which was established in 1957, has become the central institution for protecting, inheriting, and developing Yunjin Brocade skill. At present, under the guidance of representative inheritors such as Guo Jun, Zhang Hongbao, Yang Yuzhu (design and process), Zhou Shuangxi Cai Xiangyang ("tiaohuajieben", loom manufacturing and weaving) and Wan Jishen (botanic dyeing), more than 120 craftsmen are committed to protecting, inheriting, and developing Yunjin brocade handicraft and adding new vigor into it. Like the inheritors of past generations, they cherish this valuable cultural heritage of China and take the inheritance as their historical mission.

Today, it is of more excellent value in social life, such as for grand attire, high-level appreciation, decoration and tourist souvenirs. Nanjing Yunjin Brocade skill is also used for relic replication. For instance, it has been used to replicate ancient silk fabrics for institutions such as Beijing Palace Museum, Tibet Potala Palace and Boston Museum of United States and provides valuable materials to academic researches of history, archaeology and textile study, etc. It has become a precious intangible cultural heritage that we are proud of.

1.4 The status quo of traditional crafts



Figure 19. Cutting-paper museum

1.4.1 The status quo of the Paper Cutting Museum (analysis of interaction)

As mentioned above, present throughout China, and in various ethnic groups, paper-cut is a popular art integral to everyday lives. There are two large paper-cut museums, one is the privately-established Huaxia Paper-cut Museum, and the other is the National Chinese Paper-cutting Museum. Due to the same form of an exhibition and the amount of collection, we mainly analyse the Chinese paper-cutting museum in detail. The National Chinese Paper-cutting Museum is located in Yangzhou, Jiangsu province, china. The main structure of the China Paper-cutting Museum is 1,000 square meters, divided into four areas(Figure 19):

1. Yangzhou Paper-cut Art History Exhibition Hall is used to display the history and culture of Yangzhou paper-cutting as a whole, collecting, collecting, protecting and displaying famous works;
2. Yangzhou Paper-cut Master Studio, used for paper-cutting performances, allowing visitors to watch the creative process of Yangzhou paper-cutting;
3. Yangzhou Paper-cut Art Workshop is used to open a paper-cutting art training class and use modern means such as multimedia presentations to teach paper-cutting

knowledge to primary school students or adults;

4. Yangzhou Paper-cutting Exhibition Center is used to satisfy tourists' desire to purchase and collect paper-cutting products.

The Chinese paper-cutting museum is visited by a group of paper-cutting workers, artists, and enthusiasts, as well as a small group of tourists and students.

The Chinese Paper-cutting Museum follows the traditional form of exhibition---frames and hangs the exhibits on the display wall to protect these paper-cut collections. The pavilion uses the layout of "Homogeneous space". Homogeneous space has the characteristics of isotropy, which facilitates the arrangement of exhibits. The museum seldom opens windows, the interior is mainly illuminated by artificial lighting, the exhibit area is bright, and the illumination of the audience area is very low, which helps the audience to focus on the exhibits. However, due to the limited shows, the presentations on the display wall lacked focus, and visitors could not interact further. The museum does not provide a voice explaining machine service.

The construction of the museum is mainly aimed at the chronicle of exhibits and knowledge education. It ignores individual differences, and the display method is challenging to meet the needs and can not attract the audience, making

the audience single.

The exhibition hall has a demonstration of the paper-cut creation process, which guides visitors to learn more about the paper-cutting process. But there is a time limit for further understanding of the presentation technique, depending on the time of the paper cutter. Some visitors are not able to participate in this demonstration.

1.4.2 The status quo of museums of mortise and tenon (analysis of interaction)

With the development of the economy, people are paying more and more attention to traditional culture and traditional handicrafts. The growth of the structure of the 从 from prosperity to decline, and then back to the new wealth, which makes the use of mortise and tenon structure appear more in people's lives. Although mortise and tenon are being used more and more in people's lives, it is surprising that mortise and tenon culture is not like paper-cut art and Nanjing Yunjin textile art. Through the investigation, we found that China does not have a museum dedicated to the shackles. Mortise and tenon It is generally displayed and introduced as an accessory together with the building or furniture.

The structure of the mortise and tenon structure and its culture are generally found in the following types of museums: the Museum of Ancient Chinese Traditional Furniture (typically divided into public and private), the Museum of Traditional Chinese Architecture, the Museum of Wood or Woodworking (usually closed), or the company founded.

Ancient Chinese traditional furniture museum, such as the China Red Sandalwood Museum(Figure 20). The museum was opened to the public on the eve of the 50th anniversary of the People's Republic of China. This is the first and largest private museum in China, specialising in the study and collection of red sandalwood sculptures and classical furniture. It covers an area of about 25,000 square meters. The main entrance is of a wooden structure which used over 400 cubic meters of wood, with four supporting pillars of 8

meters high and 0.6 meters in diameter. The exhibiting area of the China Red Sandalwood Museum is 9,569 square meters. In September 2011, the "red sandalwood sculpture" was listed by the State Council as a national intangible cultural heritage. In 2012, the museum was recognised by the Beijing Municipal Government as a demonstration base for the protection of rich intangible cultural heritage.



Figure 20. The interior of the Chinese Red Sandalwood Museum (Chinese Red Sandalwood Museum, 2018)

This museum has five floors. It mainly displays furniture made of rosewood, in addition to architectural models and Buddhist sculptures. Although it contains a large number of exhibits, if it is from the perspective of mortise a tenon culture, its display is not enough: 1, this museum only displays valuable wood such as red sandalwood, golden nanmu, ebony. The wood that appears here is expensive; 2, the museum mainly displays traditional Chinese furniture, and the selection of exhibits is more focused on exquisite carving technology and superior design. There is very little display of the structure and production process of the concrete; 3, the museum has only a single display mode, lacking interaction with visitors. During the tour, visitors were reluctant to appreciate the most excellent furniture and sculptures, and lamented the precious wood, but could not understand the essence of the craftsmanship. It is also interesting to note that the museum has won numerous government awards and recognitions. Still, the museum is affiliated with Fuhua International Group and is not organised by the government. This also reflects the current situation of the culture of mortise and tenon, which shows that in contemporary China, there is not enough attention to the culture of mortise and tenon.

Chinese traditional architecture museum, such as the Chinese Ancient Architecture Museum(Figure 20). Chinese



Figure 21. The Chinese ancient architecture (Chinese Ancient Architecture Museum, 2018)

Ancient Architecture Museum is located in the Xiannongtan on the west side of Yongdingmen Street and is affiliated to the Beijing Municipal Bureau of Cultural Relics. In 1988, the museum's preparatory office was set up with the active appeal of experts from the cultural and literary circles, and it was officially opened to the public on September 25, 1991. This is the first unique museum in China that collects, studies and displays ancient Chinese architectural history, architectural art and architectural technology. Here, Mortise and tenon are introduced as the structure and craft of traditional architecture. The museum has special events for the hustle and bustle and occasional special exhibitions.



Figure 22. The exhibition area of the wooden tools in the Wenwang Pavilion Museum in Beijing (There are tens of thousands of exhibits in this wooden museum in Beijing, 2019)

The Chinese Ancient Architecture Museum (Figure 21) has three different types of exhibition areas: the Ancient Chinese Architecture Exhibition, the Xiannongtan Historical and Cultural Exhibition and the Mobile Exhibition Area. The ancient Chinese architectural exhibition area mainly introduces the types, structures or crafts of ancient Chinese architecture through Architecturals. Because the museum is at Xiannongtan, the Xiannongtan historical

and cultural exhibition area displays mostly the contents of the Xiannongtan, including the Xiannongtan's sources, past stories, role in ancient times, sacrificial culture, etc.; the mobile exhibition area is an area of unfixed exhibition content. Here displayed the old Chinese architectural community exhibition, the ancient farming culture exhibition, the Beijing Siheyuan art exhibition, etc. Here also hold the activities, such as Ching Ming Festival cultural activity, Lego competitions, etc. It can be seen that this is a museum mainly based on ancient Chinese architecture, involving both traditional Chinese festivals and ancient life culture. However, among these abundant activities, there are few exhibitions and events with the theme of mortise and tenon. Architecture is a broad theme that encompasses a variety of items, such as architectural structure, styling, engraving, and interior decoration. The part of mortise and tenon occupies just a small part of the theme of ancient Chinese architectural exhibitions.

The museum that displays precious wood or woodwork, such as the Wood Museum in Taihu Town (Figure 22), Beijing. This is a private museum. The museum is divided into four exhibition halls and more than 40 theme exhibitions. The history, culture and technology of the wood craftsmanship are comprehensively introduced. The leading show of the museum begins with the introduction of Luban, including woodworking tools, wood lacquer crafts, wooden transportation, wood construction, and wood farming tools. They are all built around the art of wood and traditional folk life. There is also a unique experience classroom in the museum, which allows the primary and middle school students to cultivate the craftsmanship and inherit the traditional culture.

We can think that this is a museum with the closest relationship with the mortise and tenon culture among those three museums containing mortise and tenon elements. But the reason is not its exhibition content. Still, the propaganda activities it carried out, such as there is a unique experience classroom in the museum, which allows the primary and middle school students to cultivate the craftsmanship and inherit the traditional culture. In the school, the museum also set up an interactive project to experience the interaction of wood: fitting traditional furniture or small benches, experiencing Luban locks, dismantling of small

wooden buildings, wooden toys Assembly and so on. It could make everyone to improve their understanding of traditional wood in entertainment. But from mortise and tenon, the setting of these activities also has their shortcomings: the events are mainly aimed at primary wood artisans for popularising simple handicraft skills. These interactive activities are not suitable for visitors who already know about the craftsmanship of woodwork; these activities contain the basic knowledge of craftsmanship but lack the more complicated structure.

In general, we can find that in the contemporary era, China lacks museums with the theme of mortise and tenon. In the museum, mortise and tenon are only shown as part of it. And as a separate culture, whether it is its history, its source, or its future development and innovation, there are infinite possibilities. The importance that Chinese contemporary people pay attention to is not enough.

1.4.3 The status quo of the Yunjin Museum (analysis of interaction)

As mentioned above, Nanjing Yunjin is a traditional Chinese silk craft, known as the “inch gold”, which dates back to 417 years and has a history of 1,600 years. Although it is a traditional culture, modern China also A corresponding museum has been established for this prevailing culture. The Yunjin Museum is located in Nanjing, Jiangsu Province, China. The exhibition hall covers an area of more than 4,300 square meters. The exhibits include nearly a thousand pieces of Yunjin cultural relics and related objects. The first floor of the pavilion is the Yunjin sales and costume performance hall(Figure 23); the second floor is the Yunjin Dahualou wood loom field operation display area(Figure 24), the south is the ancient silk cultural relics replica and the handed down Yunjin rods authentic display area; the third floor is Zhonghua Brocade Village It is a Chinese brocade machine and physical display area; the fourth floor



Figure 23. Yunjin weaving machine (Yunjin Museum, z.d., pp. 1-3)



Figure 24. Introduction to Yunjin production process text (Yunjin Museum, z.d., pp. 1-3)



Figure 25. Yunjin pattern weave(Nanjing Yunjin weaving skills picture_Baidu, z.d., pp. 1-3)

is a traditional art exhibition area such as the design of the artist and the picking of flowers. However, as far as the current form is concerned, the usual methods of publicity are carried out through simple interactions. It is not very good for popularisation or propaganda for all the people, because it usually goes to the Yunjin Museum. The crowds are all family-based or organised by the school, so the main body of the visit is mainly children or students. The student

and child-oriented tours are usually uncontrollable and will not be visited and studied according to the established route of appointment. It is very likely to find more exciting and better-understood content in their eyes to visit. In this process In the museum, the way of the exhibition in the museum and whether there is an interactive device or interactive content that attracts people and fully expresses ideas becomes a permanent link. However, the current Nanjing Yunjin Museum did not upgrade the exhibits or introduced it traditionally. In the pictures, there is a real Yunjin looms in the Yunjin Museum. Some craftsmen show on the spot(Figure 25), but the visitors can't participate in the activities very well. I think there are three reasons for this. First, the Yunjin looms are plentiful, and it is difficult for visitors to observe the looms at close range; Second: The craftsmanship of Yunjin looms involved, and the speed of weaving is prolonged. All the visitors have been able to directly observe the weaving activities without the knowledge of the pavilion. The principle of weaving cannot be understood, and it may not be in a long time. It will

show the woven fabrics to the visitors, so it is challenging to continue to attract the attention of the visitors without the positive feedback mechanism. Thirdly, the process of weaving is complicated, and the steps are numerous. The visitors may only visit one — a small part of the process, which causes misunderstanding or misinterpretation of this skill. Besides, the above mentioned, the technique of Yunjin weaving is very complicated, but more in the museum is the use of text display, as shown in the figure? In the upper right picture, this picture shows the “Yunjin traditional production process”, but it uses a mind-like approach to show six steps. There are many small steps at each level. Adults whose native language is Chinese are readable, but not very attractive, so it is not feasible to display such words and arrangements to children or students or visitors from other countries. Also, as a shown figure? The picture at the bottom left shows that the pattern in the image is a weaving method display of "weft organisation", but the explanation card next to it introduces the name of the weaving method in the picture and the dynasty that appears.

1.5 Conclusion

Through the research and analysis of Chinese traditional culture, we have found the starting point of traditional Chinese handicrafts for paper. What is the craftsmanship? The handicrafts we emphasise now, from the most fundamental aspect of view, are the creation of human material culture. This chapter analyses the current development of traditional Chinese craftsmanship and the reasons behind the formation of this development status. China has a rich intangible cultural heritage. They condense the most valuable artistic genes and spiritual beliefs of the Chinese nation. Non-material cultural heritage is the crystallisation of thousands of years of hard work and

wisdom of folk crafts. It is also the root of the inheritance and context of Chinese culture. With the development of the industrial age, many traditional Chinese handicrafts are on the verge of disappearing. How can the new era awaken the “artisan spirit” and revitalise traditional crafts, not only the problems faced by conventional handicrafts but also the question of how culture is innovating.

The statistics of traditional Chinese handicrafts are a difficult task. Through the United Nations' Lists of Intangible Cultural Heritage and the Register of good safeguarding practices, this chapter has compiled 14 of the most essential

and representative Chinese traditional handicrafts and introduced those 14 handicrafts. Then, by analysing the development status of each craft, the difficulty of operation, the complexity of display and other conditions, three more typical traditional Chinese handicrafts were selected: Chinese paper-cut art, woodworking Mortise and tenon art, and Nanjing Yunjin brocade. A more detailed introduction and investigation of these three traditional handicrafts were also introduced.

In 2015, the relevant agencies published a “Report on the Status of Chinese Traditional Handwork”, which reflected the challenges and opportunities faced by traditional Chinese crafts at that time. According to the report, 86% of conventional manual practitioners in China are distributed

in rural areas, 55% of traditional manual practitioners are over 50 years old, and nearly 70% of the income is below 20,000 yuan. At the same time, the survey also found that almost 60% of traditional manual practitioners have not yet found heirs. The data shows that nearly 70% of respondents are not willing to learn traditionally.

In this context, the way traditional Chinese crafts are displayed should be noticeable. In the last part, the article analyses the current status of the three conventional handicrafts of Chinese paper-cut art, woodworking Mortise and tenon art, and Nanjing Yunjin brocade in China. We can easily see that the status quo of each handicraft display mode in China has its problems and development bottlenecks.

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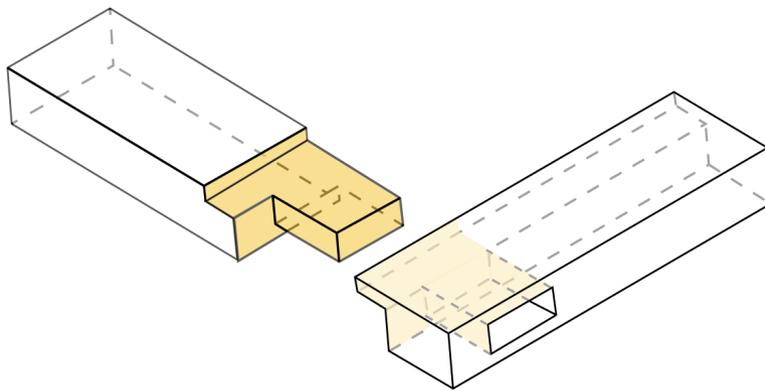
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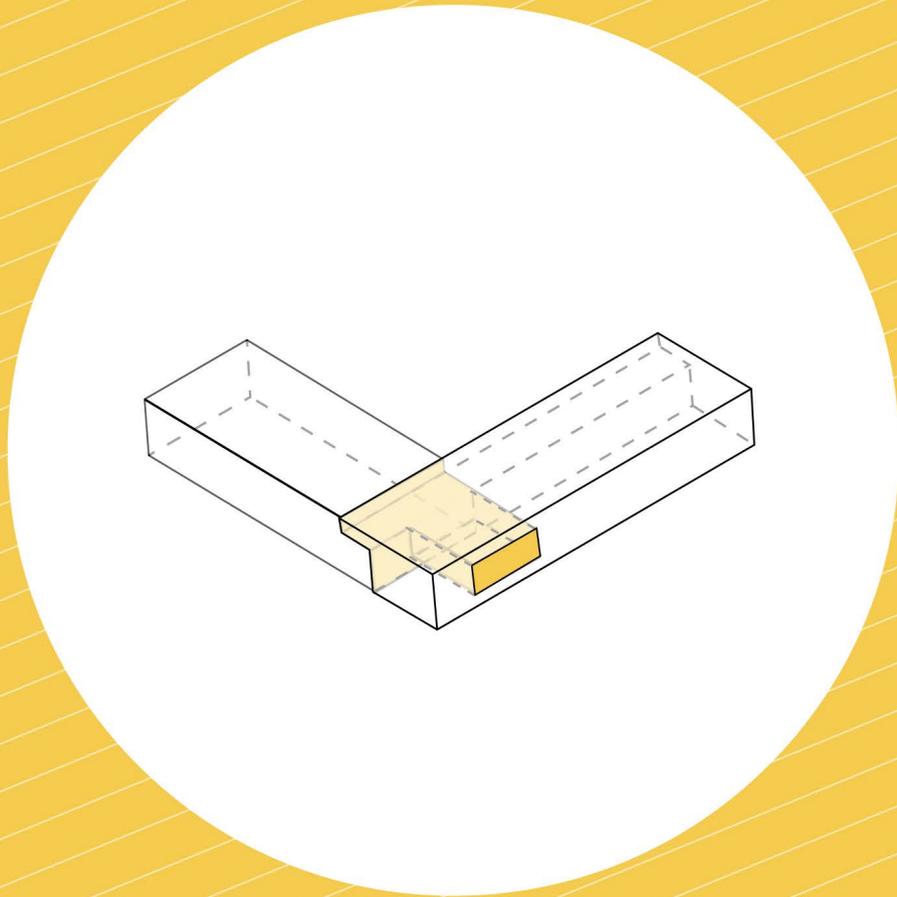
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RESEARCH ON THE CURRENT
STATE OF DISPLAYING
CULTURE IN EUROPE

2

2.1 Basic introduction

Although this paper aims to explore how to better express Chinese traditional art, in this case, it is necessary to research the cultural display methods of other countries. The display of classic Chinese art not only benefits from the Chinese but also targets people from different countries. In the spread of art, it should not face a limited group. Employing various means to express creativity, the painting itself is spread in different forms and is accepted by more people. This should be a problem we are discussing together.

Europe includes a large number of countries, each with its own unique cultural identity and attached to different works of art. In this unique cultural context, how to display your cultural characteristics has become an important issue. To a large extent, the main communication base of culture and art is still built on top of museums. We cannot deny the importance of temporary exhibitions and online exhibitions. The flexibility of these exhibitions not only makes the cost of cultural communication lower but also contributes to their better acceptability. These unique characteristics have

enabled art and cultural life to be integrated into the lives of modern people in a more comfortable and faster way. But at the same time, based on the flexible nature of these exhibitions, the difficulty of statistics and research is also rising. It is difficult to count all temporary exhibitions fairly and comprehensively. So this part of the study is mainly based on the direction of the museum. In modern life, a variety of museums have become the best choice for people to visit. Europe is the most densely populated area of the museum. From this perspective, we believe it is necessary to conduct an extensive survey of European museums. It is thus discussing how culture is being displayed and how it is spread in Europe. In this chapter, there are two starting points: 1. Discuss the current situation of European museums (focusing on Italy as an example), and pay attention to cultural display cases; 2. While illustrating the case study of museums, we can know the popular exhibition means at the same time. The trend of. This part will also be fully covered in the second section.

Here we mention Italy as an example. In the last years,

Number and proportion of different kinds of museums by type of collection

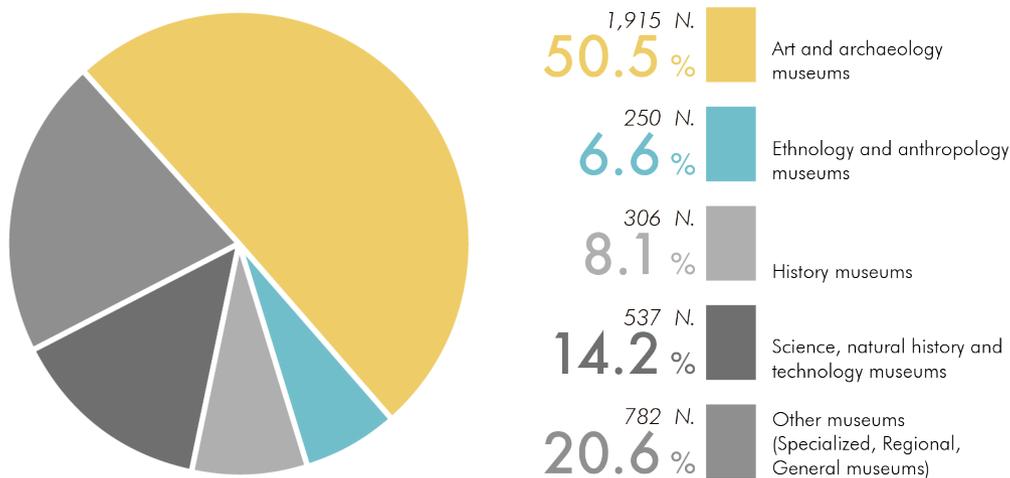


Table 22. Number and proportion of different kinds of museums by type of collection

Distribution of museums in Italy

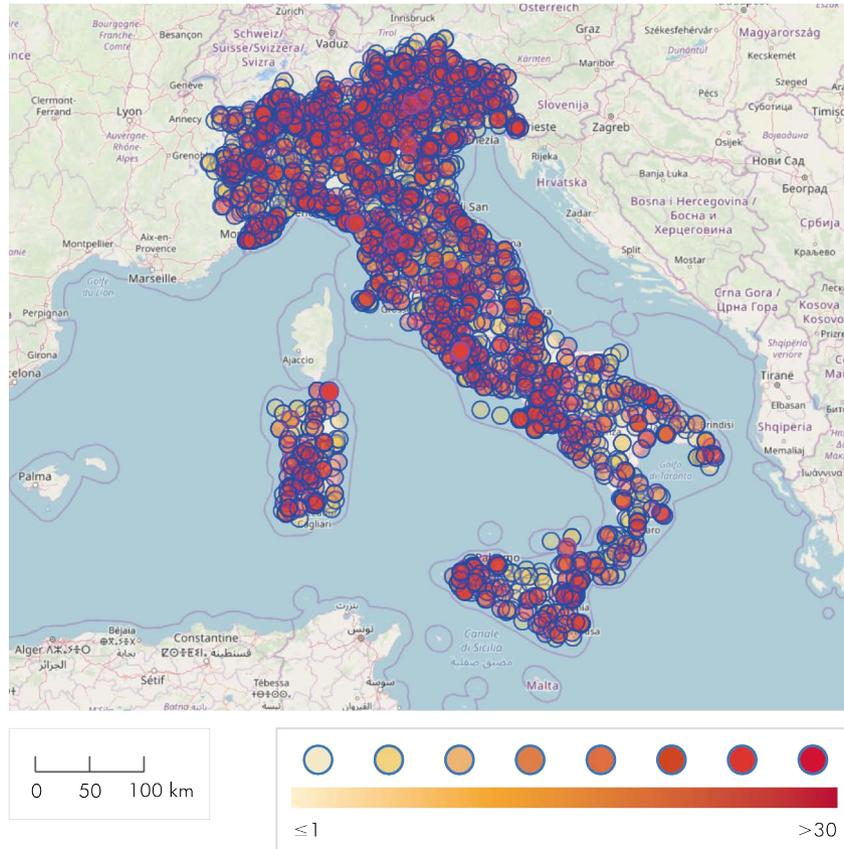


Table 23. Distribution of museums in Italy

In recent years, cultural activities and behaviours have become increasingly important in Italy. Based on Italy's unique cultural attributes, the number of private museums has been steadily increasing. In the field of statistics, the Cultural Statistics Working Group (SISC) was established in 1997 to develop a comprehensive system of social statistics. SISC defines the definition and classification of the museum. In Italian surveys and statistics, the permanent collections conserved by museums are classified by the following categories, depending on the main character of the materials and objects: Art and archaeology museums; Art and archaeology museums; Science, natural history and technology museums; Ethnology and anthropology museums; Other museums (Specialized, Regional, General museums). (Hagedorn-Saupe & Ermert, 2004) The museums of cultural arts and crafts that we are interested

in are mainly distributed in Art and archaeology museums, Ethnology and anthropology museums, which account for 50.5% and 6.6%, respectively (Table 22).

Through the map data obtained by Overpass Turbo, we can see the distribution of almost all the museums in Italy (Table 23). This is a good phenomenon: although the size of the museum cannot be determined one by one, we can see that all the museums are relatively evenly distributed in various cities in Italy, but not only in large and medium-sized cities. Art and cultural activities are taken place in every town (even on islands with few inhabitants). This allows every resident to enter the museum and get in touch with art. It also shows that there are opportunities for everyone to be exposed to art and cultural events held in museums (even outside the museum).

2.2 Case study

2.2.1 The display form of European culture

1- The art of painting and new technology presentation

The traditional art of painting is an essential means and means of cultural inheritance and development of a country. It has a specific time, place and cultural background at the time, and it also conveys the personal feelings of the author at that time. A lot of information will be gathered on the picture of this painting. If people who don't understand the culture and background at that time stand in front of such a snapshot, it is difficult to capture and understand the meaning and information expressed by this picture. With the development of digital technology, innovative applications have been realised in the digital representation of graphic images and interactive experience technology. Through the organic combination of art and technology, the connotation and extension of traditional art have been expanded,

providing information dissemination and reception. Effective Ways.

Now, how to demonstrate the value behind oil painting by other means is worth exploring. This is a culturally sustainable way of communication. For example, Van Gogh's oil painting uses the new technology to create the cartoon "loving Vincent". In the animation, Van Gogh's life scenes and portraits are reproduced through Van Gogh's original paintings and letter content. The work re-edits the original still picture by re-editing some aspects of the image. Let the people watching can better understand the meaning of the painting itself and the environment and culture at that time. (Figure 26)

For example, Korean artist Jee Yong Lee created the dream work "The Last Supper", which is based on the famous painting "The Last Supper" and then expresses the meaning of the art through his understanding, although the final expression is the original painting. The entry is large, but to

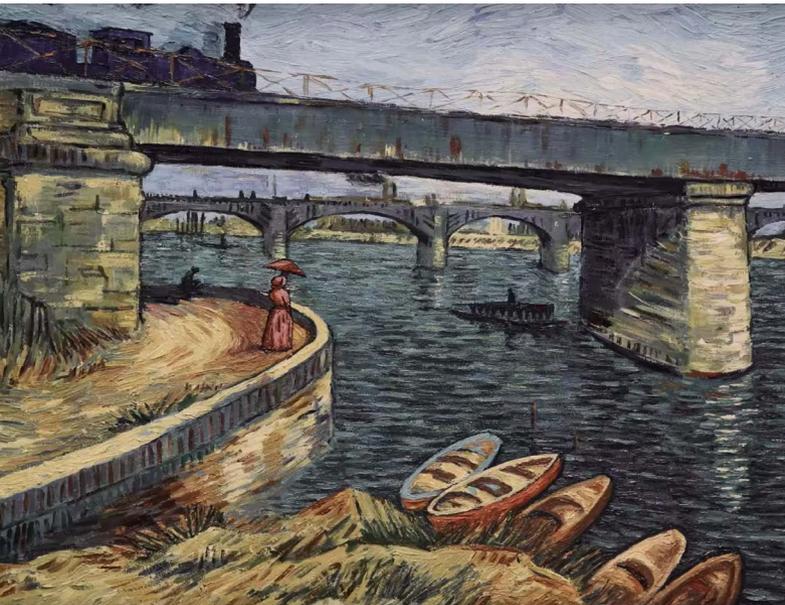


Figure 26. Screenshot from film "Loving Vincent" ("YouTube", 2017)



Figure 27. The Last Supper (Lee, 2011)

a certain extent, the author is re-expressed by refining the cultural information and symbolic information. The artist integrates himself into the middle of the famous painting, combines the realistic appeal with the meaning of the original art, and disseminates the knowledge of the shared resource shortage.(Figure 27)

At the same time, the public digital service platform also has an excellent display of this kind of information and culture. The most famous is Google Art. It plans to cooperate with museums all over the world to use its streetscape technology to display the interior and exterior of the museum.

Here we noticed an exciting gallery called Gallery One. This is an iconic space intended to appeal to young people. Here, the exhibits encourage people to move and promote the connection with the art that is written on the human body.

The display in front of the work analyses the look and expression of the visitor and then matches and finds a work of art similar to the visitor's form. (Figure 28)

The visitor should have control what he or she wants to know. Through these exhibitions, visitors have switched from a 'passive' acceptance perspective to an 'active' acceptance

perspective.

2-The art of sculpture and new technology presentation

At Cleveland Museum of Art, Local Projects reinvented Cleveland's most famous museum by changing the way visitors interact with art.

In the sculpture exhibition area, to celebrate people's understanding of various forms, the "local project" tests its modelling ability by giving visitors a way to imitate the poses in the CMA collection of artworks. When a visitor poses, the Kinect motion sensor measures the accuracy with which they can recreate the pose from the original artwork and scores the performance. (Figure 29)

Local Projects also designed a way to make visitors feel like they entered a historical story. Here they visited a large screen in front of the artwork. On the electronic display, visitors can see where this ancient sculpture has appeared before (Figure 30) . If the visitor can clearly understand the background story of the ancient statue and has a complete picture, this can help the visitor to understand the icon better.



Figure 28. The computer analyzes the expression on a visitor's face (Local Projects, 2018)

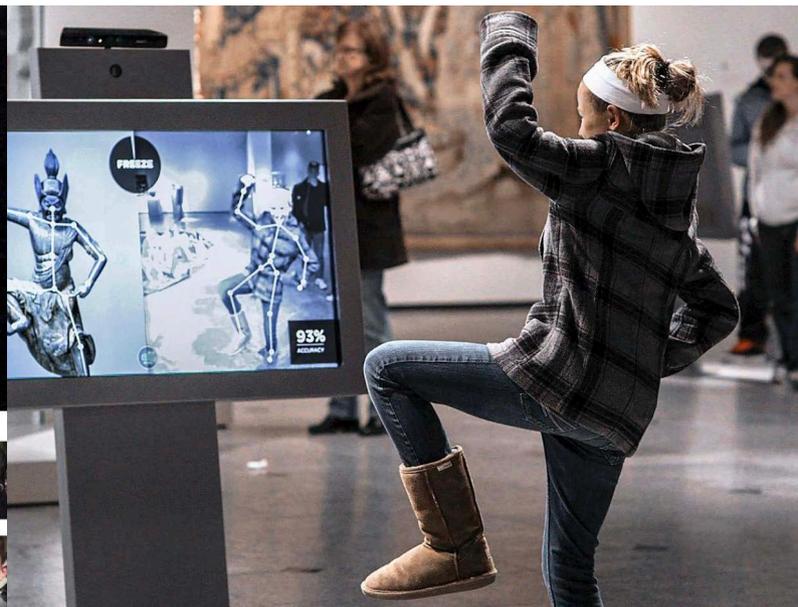


Figure 29. Tourists are interacting with the screen (Local Projects, 2018)

By contextualising the collection of CMA, it makes visitors feel like travelling for a time. In this way, visitors are better informed about the artwork and the story behind it.

3-The art of material works and new technology presentation

Whether it is, it is historic, or it is artistic, glass is an indispensable material in Italy. At the Glass Museum in Murano, there is an exhibition of History of Glass. (Museo del Vetro,2019)

Lengthy texts always accompany presentations with historical backgrounds. There is a unique part of the history of the exhibition glass. Some scenes appearing in the introduction of the ancient background story ultimately used a lens to create a scaled-down view (Figure 31) , thus using the material itself to interpret the historical background story of the content.

Qwalala (Figure 32) is worked by American artist Pae White, exhibited in the gardens outside LE STANZE DEL VETRO.(Domusweb.it, 2019)

Although this work has nothing to do with Venice at the beginning of the creation, it is interesting that it was produced and exhibited in Venice. As an essential city of glass, Venice has a beautiful relationship with this sculpture. Both seem to be in contact with each other and influence each other. If we look from the point of the re-presentation of the materials, this is a work that gives us a lot of ideas.

4-The art of food and new technology presentation

The 'How to Become a Modern Wine' exhibition, commissioned by the San Francisco Museum of Modern Art, was exhibited at the museum in 2010. This is the first exhibition to consider modern, global wine culture and design forms.

The entire exhibition comprehensively displayed wine. There is a noteworthy part of the exhibition. To better interpret the wine, the founder has applied many methods to mobilise the feelings and perception of the visitors.(Figure 33)



Figure 30. Visitors can see where this historical sculpture has appeared before.
(Local Projects, 2018)



Figure 31. A historical scene made entirely of glass.
(Museo del Vetro,2019)

2.2.2 The display form of Chinese culture in non-Asian cultural circles

Scenography for a Chinese Science Fiction Opera, 2015, mixed media installation featuring a hand-painted theatre stage set paint on canvas, wood, steel, motors. Ming Wong created the author of this installation.

The core of this work is a self-question, questioning the linearity of time and the culture of space. The combination of traditional Chinese elements and new space elements is also an old, time-linear collision. (Scenography for a Chinese Science Fiction Opera | Ming Wong, 2019) (Figure 34)

This method of the display can attract a large number of visitors, but one problem is that not all audiences can understand the symbolic meaning of these patterns. This is undoubtedly an incredible work, and the purpose is to guide the inner dialogue between the tourists and the self. But it is difficult for people who don't understand to stay here because there are no further means of interaction to understand the connotation.

Here is another Art work called the Lanterns of Terracotta

Army. They are 90 colorful, luminous sculptures crafted by Chinese artist Xia Nan, installed in the courtyard of the Old College of Edinburgh University. These lantern warriors, who are taller than life, are up to 2.5 meters, including men, women and children with horses. When lit, their bodies glow in red, green, white and blue. Their structure is consistent with the tradition of Chinese lanterns, which traditionally put colored paper on bamboo or metal frame hoops. (My Modern Met. 2019) (Figure 35)

This is a way of attracting visitors. It is difficult to stay here. It is very strange for locals who don't know about terracotta warriors. Why are they arranged in this way?

2.2.3 The display form of Chinese culture in china

A Journey of Chinese Characters is an interactive exhibition at the Beijing World Art Museum that brings the written Chinese language to life. (A Journey of Chinese Characters



Figure 32. Qwalala (Domusweb.it, 2019)



Figure 33. "Smell Wall" allows visitors to inhale from flasks of wine on the display (Millman & Verhave, 2017)

— 2x4,2019)

This kind of interaction can attract children's interest and increase children's interest in learning Chinese characters. It is a good way of cultural cognition---education. But the cultural circle is limited. (Figure 36)

An Ode to the Goddess of Luo is written by an illustrator, Ye Luying, who is based on the poetry essay "Luo Shen Shen" of the Han Dynasty poet and essayist Cao Zhi. It describes the encounter between the poet and the goddess Luo, their love and their romantic inevitable sad ending. (Soh-

-u.com,2019) (Figure 37)

The painter, she re-selected a form of painting that is more acceptable to modern people, to re-create, to spread the purpose of this poetry prose, and to promote traditional culture. It is attractive to painters and painting circles, lacks the participation of modern interactive technology, lacks innovative means, and only projects this prose poetry in this era, time-limited.



Figure 34. Scenography for a Chinese Science Fiction Opera, 2015
(Scenography for a Chinese Science Fiction Opera | Ming Wong,2019)



Figure 35. Lanterns of Terracotta Arm (My Modern Met, 2019)



Figure 36. A Journey of Chinese Characters
(A Journey of Chinese Characters — 2x4,2019)



Figure 37. An Ode to the Goddess of Luo, Ye Luying
(Sohu.com,2019)

2.3 Conclusion

From the distribution of the museum in Italy, the delivery of the museum in Italy is more extensive and uniform. Not only in large and medium-sized cities, but also small towns and even villages, there are many museums and art galleries. This allows every resident to enter the museum and get in touch with art. Between the significant number of museums, Istat records, for 2016, as many as 4,158 museums, 282 archaeological sites and 536 monuments, for a total of 4,976 places, approximately one for every 12,000 inhabitants of Italy. All together they are in 2016 over 110 Million people, which more than half (57%) were willing to pay a ticket to enter one of these places. It also shows that there are opportunities for everyone to be exposed to art and cultural events held in museums (even outside the museum).

At the same time, we can also think that the spread of culture is accessible to people. People are happy to learn about and visit new cultures and unknown content.

Concerning the way culture is transmitted, we see more and more emerging directions through the case study. They include AR, VR, APP and other new ways. Traditional culture and art are combined with modern technology, which gives old content a new way of exhibition. This not only can better display the conventional perception, better interpret the connotation and significance of traditional culture, but also help visitors to understand the exhibits better, and even more easily make people have a more profound impression and understanding. In this respect, this not only makes the exhibition more successful but also allows traditional culture and art to penetrate deeper into people's lives.

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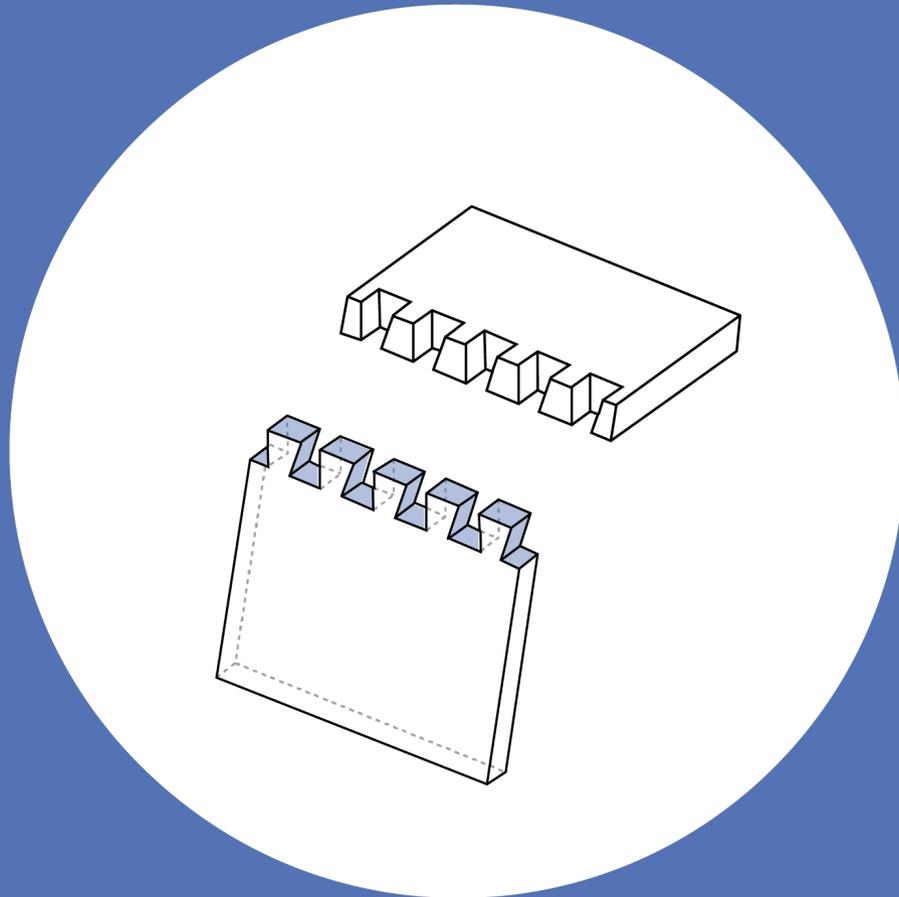
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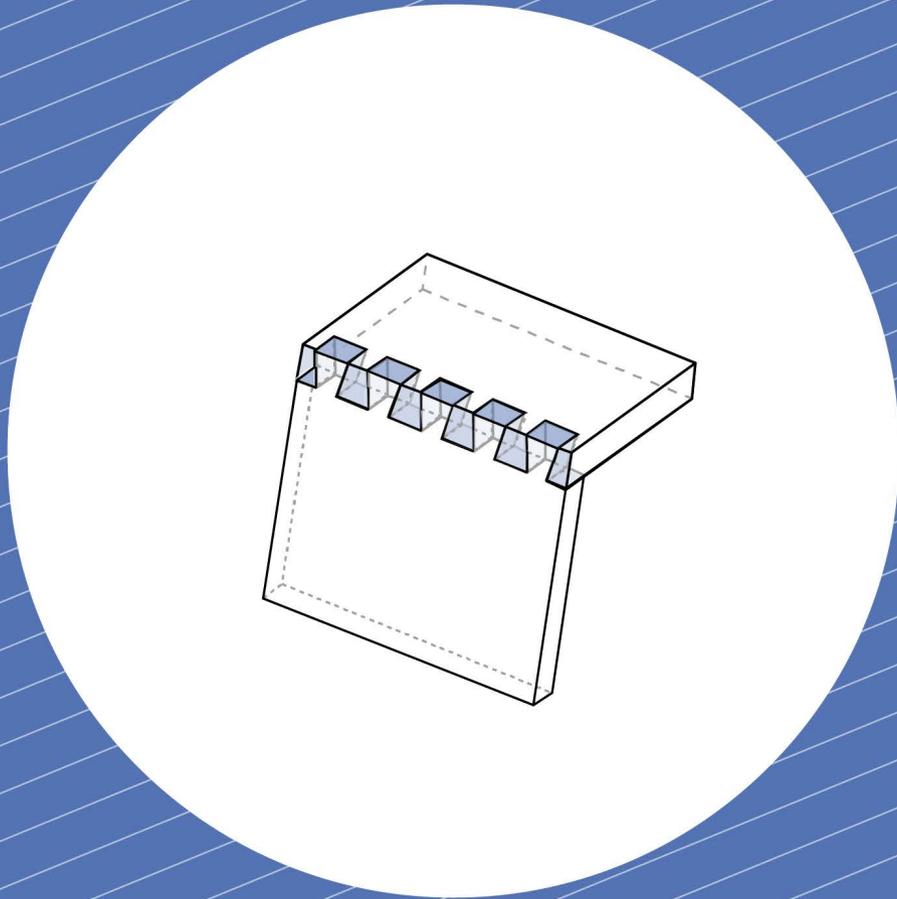
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DISCUSSION ON THE RELATIONSHIP
BETWEEN INTERACTION MEANS AND
TECHNOLOGY

3

3.1 The impact of technology on interactive means

At the moment of the development of science and technology, technology has presented an increasingly prosperous scene. Under this prosperous scene, the interactive means are also developing synchronously, and new interactions brought by numerous new technological innovations have emerged one after another. It appears in our lives like springing up. It is necessary to discuss the connection between different technologies and different interactions before the discussion can interact with the interaction means. As we know, the interaction can understandable as disrupting, empowering, optimizing, expressing, advertising, and connecting. Here we roughly analyze the means of interaction.

3.1.1 Interactive mode analysis

In the rapid development of science and technology[1], there have been countless kinds of interactions. Starting from the most primitive text and language methods, more high-tech methods have emerged in recent years. For example, the emergence of VR somatosensory interactions on people's lives. And the way learning is done has a significant impact. In the present life, most of the interactions we have come into contact with have been improved. This is reflected in all aspects of daily life. It is no longer a written expression, but a variety of interactive means. For example, Apple's SIRI is the closest voice interaction with our lives. So in this part, we mainly explore the means and methods of interaction from the perspective of smart devices.

First, the general part of the input and output mode is summarised.

The main forms of input are:

- 1-mechanical or button or knob
- 2-touch button

- 3-text command
- 4-mouse and keyboard
- 5-voice
- 6-human body movements and gestures
- 7-eye tracking
- 8-brain wave
- 9-muscle current

The main parts of the output are:

- 1-visual output
- 2-signal light
- 3-display
- 4-machine movement
- 5-release gas, smoke, water spray, etc.
- 6-Aural output
- 7-play sound
- 8-tactile output
- 9-vibration
- 10-current

The usual interaction methods are composed of an input port and an output part. The input and output methods are not fixed. In the main form of input and output changes, a variety of different interaction modes can be combined. In the current development trend, the change of input has become closer and closer to the natural reaction of human beings, and the way of output is more and more intuitive and easier to understand.

1-Mechanical buttons or knobs: The frequent interactions here are basically in the form of products. Commonly used, such as knobs and light switches for microwave operation, are usually: accurate, distinct marking systems, and current feedback information. So this type of interaction is the most common and most common at this stage. But it also has its shortcomings. Usually, it is bulky, and the function is single, just "on and off" or "resize" functions, you can't combine multiple functions on the same mechanical button or knob because of it The reason for the mechanical structure.

2-Touch button: The touch button is an upgrade to the

mechanical button or knob. It can replace the traditional mechanical button and knob. The advantages are similar, accurate, with active feedback and eye-catching indication. The disadvantage is that it is bulky.

3-text command: The text command is also a new interaction method. For example, the interaction method in the museum mentioned above is more adopting this interaction mode. Its advantage is clear and more potent. Because The description function can be performed in a language manner, and corresponding adjustments can be made in time as needed. But the shortcomings are also evident. Its shortcomings are also very difficult to change. Due to language factors, it takes a lot of time and experience to make memory commands. It is an unfriendly interaction with some users, such as the elderly and children. And because of the language factor, it is a more costly learning process for users of different cultures and languages.

4-Mouse and keyboard: The mouse and keyboard are easy to use in daily life. The advantages are an accurate expression, robust and do not require a lot of memory commands and usage, but the mouse follows the disadvantages. It needs to work with the keyboard, and it also requires much space to place the device.

5-Touch operation: The touch operation is a more unique and more natural expression brought by the development of modern technology. The advantage is that the information input mode can be cut-off, the function is mighty, the user does not need mandatory memory, and the volume is small. The disadvantage is that the user must use the touch of the hand and the touchpad.

6-Voice: Voice operation is a newer way than the above interaction mode. The advantage is that it does not need to be in contact with the device, and the volume is small, which is more in line with people's usage habits. However, the disadvantage is that the information cannot be accurately input, and the noise and distance are affected. The impact and the factors that influence it are massive and can not receive and transmit complex information very well.

7-human body movements and gestures: the updated interactive means, the advantage is that the same does

not require contact operation, the volume is small, is a comfortable operation mode of people, but the disadvantage is the distance and light effects.

8-eye tracking: The frequency of eyeball tracking is getting higher and higher at this stage. After the widespread use of Google glasses, more devices have begun to try to input and hide information in such a way, and the volume is small. However, its shortcoming is that it is not the way people are used to, they need to learn how to use it, and it is not an accurate input method, which may cause errors and is greatly affected by distance.

9-Brainwave: The interactive input method of brain waves is not standard in daily life, but its advantage is more natural interaction. Still, because such technology is not conventional in the current life, it may need to learn the cost and is not accurate enough.

10-muscle current - Muscle current is also a new way of interaction; the advantage is natural, and the reaction speed is breakneck, but the disadvantage is not enough preparation and function is single.

For the above analysis of the input method, we can use these analyses to do some new thinking about the design of the new device, and there are some considerations for the shape and volume of the product; below we will analyze the advantages and disadvantages of the output mode, but because of the output The way is usually determined by the place where the vision, hearing, and touch are adapted, so we will divide it into three small parts for analysis.

1- Vision output: The visual output is more abundant, and can retain information for feedback in different places for a long time. The disadvantage is that it takes a long time to watch and learn, and receives the limitation of the size and distance of the venue. The equipment is usually large.

2-Aural output: Auditory output is a more natural output method compared to visual output. Most museums and scenic spots use this method to output information. You can use head-mounted devices or close-range devices for the information output. The disadvantage is that it may be disturbed by noise or the like in the environment, and the information is output more publicly and is not suitable for transmission of complex information and output of

composite information.

3-Tactile output: The advantage of tactile output is that the information is relatively concealed, and the factors affected by the surrounding environment are small. The disadvantage is that the tactile information cannot output complicated information when it is output. Because the user needs direct touch, it may cause certain users. The use of pressure, and the need to use equipment very close distance.

For the above analysis of the output and input, we can make better use of the various input and output methods in the later design.

3.1.2 Interactive means and technology

In the above content, we analysed the input and output methods of interactive means. It is not difficult to see that some of the factors need to use technology, starting from the simple human-computer interaction realized by the most basic screen, to relying on emerging Technical gesture capture or eye-tracking, etc., technology can be said to be the fundamental way of presentation of interactive means, of course, let the interactive methods have the possibility of further development.

3.1.3 Existing mature interactive means relying on technology cases

At this stage, the interactive display method based on scientific and technological means is universal. When it comes to interaction, the easiest thing to mention is the interface interaction. Interface interaction is currently accessible to everyone in daily life. The simplest, For example, the smartphone we use. There are usually several different functions in a smartphone, but they are all interface

interaction applications. According to the China Internet Report Survey data, in the Chinese market alone, as of April 2018, the number of applications in the Chinese market reached 4.14 million[2].In this huge number of applications, the application growth of games is the fastest. By April 2018, the number of game applications reached 1.45 million, and the application of life services ranked second, with a total of about 498,000. The third and fourth-ranked respectively asked about the application of e-commerce and video playback, accounting for 392,000 and 366,000, respectively (Table 24). In the existing applications in the market, the number of applications for providing two-dimensional code scanning, transfer, and other financial payment functions has reached approximately 13,000 ("Annual growth in the mobile app (APP) in 2018-China Industrial Information Research Network", 2018, pp. 1-3).

Behind these complex applications are supported by advanced technologies. Here, we will analyse several applications that use different technical means to achieve

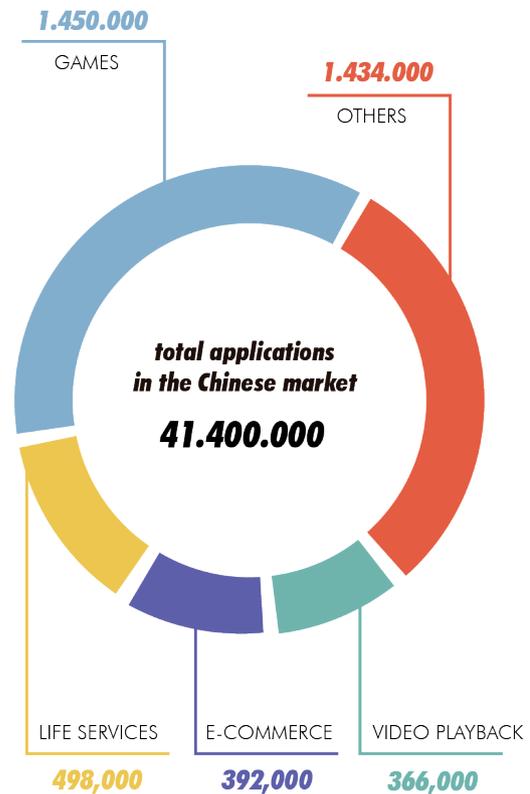


Table 24. Proportion of applications in Chinese market

excellent communication with users.

3.1.3.1 Interface interaction case analysis

i) See (见)

"See" is a free-to-play free game for people with visual impairments who live and travel in the Tencent Dream-catching program. It is produced by Tianmei Studio Group, allowing players to experience travel from the perspective of visually impaired people and pay attention to the safety of particular groups (Figure 38). To create a more convenient public environment for them. By simulating the visual and

tactile sensations of the visually impaired, the game allows the players to understand the visual impairment of the visually impaired people due to inadequate social public facilities, people's attention to the lack of travel difficulties, and appeal to the public to give more attention and understanding to the visually impaired.

The scene at the beginning of the game was developed from the perspective of a visually impaired person. The view inside the picture was difficult to adapt at first, but at the same time, there was a suggestive slogan "This is the event I saw. Please don't be afraid, hope. You can adapt to this perspective." The first task reminder will appear.

The two triangles in the lower right corner of the screen can control the movement of the angle of view, and the user can touch on the screen to achieve a particular field of view to be illuminated, thus simulating the process in which the visually impaired person needs to feel the item and perceive it in daily life. In this process, the user needs a particular learning time. The first use is painful and not easy to understand, but it is not easy for the game to convey the visually impaired person to live in this way.

In the following process, the help of "guide cane" will appear. Tap the screen to give audible feedback. There will also be a red feedback marker on the screen to indicate that the path is passable or impassable. In the process, the output is output. The way is not simple picture output, but also increases the production of the sound, better simulating the real use environment of the visually impaired.

ii) MyScript Calculator

This is an application different from the usual calculator. Users can directly input the numbers and formulas to be calculated on the screen instead of finding the corresponding symbols and signs on the virtual keyboard (Figure 39). The input method used by this application is different from other apps with the same function. As mentioned above, other apps require users to click on the virtual keyboard of the smartphone to enter numbers or symbols. Users may need to switch the input method and interface back and forth in the virtual keyboard to achieve the correct input results. However, the app only requires the user to write the input on the interface to complete the

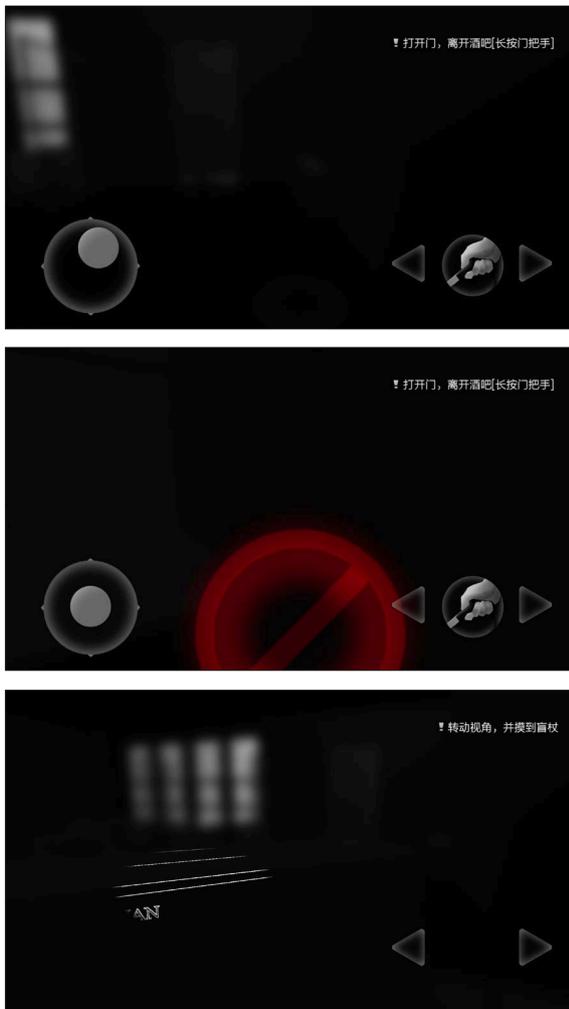


Figure 38. "See" In-game screenshot

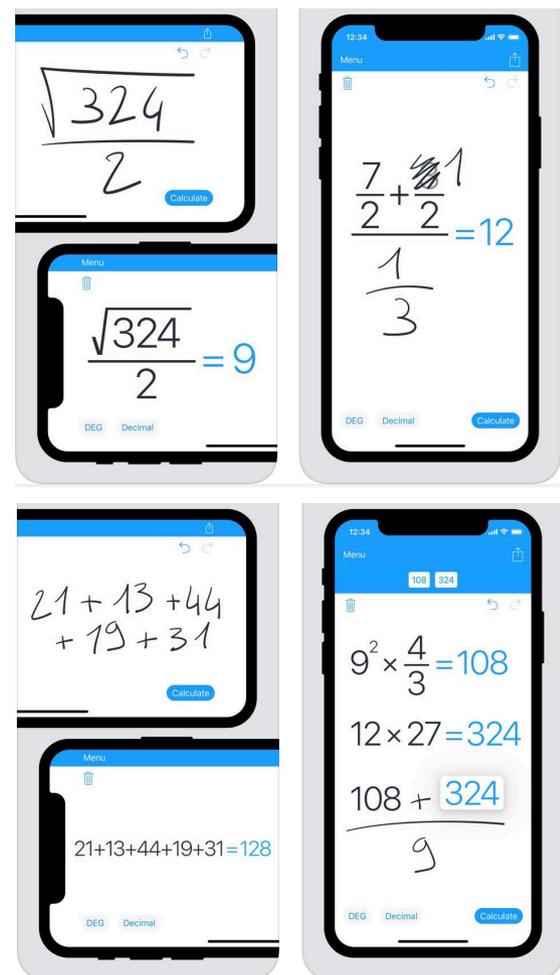


Figure 39. Myscript Calculator screenshot

above content.

iii) Forbidden City Exhibition

At the same time, the Palace Museum has produced a series of apps that explain the cultural relics and traditional Chinese culture for modern people using the application to learn effectively. Here we have selected three apps with unique interactions or exclusive explanations (Figure 40).

The National Palace Museum provides the functions of "online exhibition" and "offline exhibition information inquiry". After opening, the first thing that caught your eye

was the recent exhibition of the Forbidden City. You can find your favourite exhibits by looking at them, by date, or by status (all, exhibiting, past shows). Click on the icon on the far right to switch between display modes, and browse the date and location of the exhibition on the homepage. People who are suitable for viewing the show offline choose the show you like and get more detailed information. Under the notice and introduction, there is the entrance to the work and online display. The online view can select VR mode. According to the movement of the head, the content of the picture changes immediately, and the arrow can be quickly steered. Click on the positioning to call up the orientation map, and the range of the eye can be scaled directly with your finger. Click on the collection of interest to view a larger image and get more information. The app includes a quick search function (exhibition search, QR code scan, map search). If you encounter an exhibition or exhibit that you like, you can click on the collection to view it again later.

At the same time, the National Palace Museum has also launched an app (Figure 41) that specialises in introducing porcelain. The name is: the China of the Palace Museum

This app sorts out all the collections in the 'Wenhuanian Ceramics Museum' in the Forbidden City according to the timeline. Hold the group and slide it left and right to enjoy the 360-degree view of the group. You can read the text as well as listen to the recording, we are not looking at one exhibit, but through presentations to understand our long history.

iiii) Twelve Beauties Of Prince Yong

The figure of the beautiful woman is also the figure of the Yongzheng Twelve Beauty (Figure 42). It is the common name of the 12 pictures of the Han Dynasty, which is collected by the Palace Museum. It is generally believed that this group of beautiful figures is related to Emperor Yongzheng.

This app uses a lot of small dynamic details to make the original static paintings lively and energetic. In the picture, the combination of the beautiful hands in the hands, the original painting gently shakes, attracting you to click to view the details.



Figure 40. Forbidden City exhibition screenshot



Figure 41. The porcelain of Palace Museum screenshot

In the composition appreciation mode, it will present the abstracted composition of the picture for you, and you can see the original film with a long press, and slowly change to line composition. This kind of image contrast, with text interpretation, so that ordinary people can understand the form.

This app uses a lot of small dynamic details to make the original static paintings lively and energetic. In the picture, the combination of the beautiful hands in the hands, the

original painting gently shakes, attracting you to click to view the details. In the beauty map, explanations are given in every aspect, which reduces the difficulty of appreciating a painting. Many objects and images in the picture can be clicked to understand further, and there are pictures and animations. We can learn a lot about exciting things in Chinese traditional culture. For example, Bian Dian and Goldfish are symbols of romance and love.

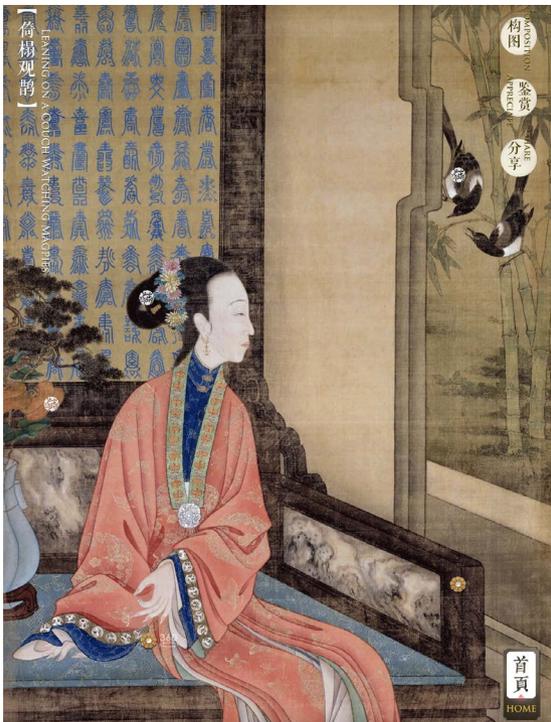


Figure 42. Twelve Beauties Of Prince Yong screenshot

3.2 The emergence of new technologies and current application directions

Nowadays, with the rapid development of science and technology, new technologies or technologies have been developed and applied every year. Here we will analyse some of the new technologies that have gained a lot of attention during the past five years (2015-2019). These technologies are more inextricably linked to interaction design and help promote the development of interactive disciplines.

3.1.1 Introduction and generalization of technology

3.1.1.1 5G (tactile internet)

At a time when 4G technology is mature, 5G technology has entered the public's field of vision. Compared with 5G and 4G technologies, the innovation of interactive means brought by the middle is massive, because the gap between 4G and 5G in transmission speed may cause inevitable data delay and information to be transmitted at the same time in the original interaction means. The problem, we can compare 4G and 5G to tubes, 4G network pipes are one-way, can only be downloaded or can only be uploaded, so in some cases, there may be delays between upload and download. The time difference is too long, resulting in poor user experience or information can not be immediately transmitted. Still, the 5G network can be likened to two pipes, one of which is only responsible for uploading, while the other is solely responsible for Download, which ensures that uploads and downloads do not affect each other. It can be said that 5G is not only its innovation but also the cornerstone of the entire scientific and technological community. The following will be analysed; for example, IoT and AR & VR are all related to 5G technology.



Figure 43. VR game screen (photo from google)

3.1.1.2 AR & VR & MR Virtual reality (VR)/Augmented reality (AR)

Virtual reality :(VR) (Figure 42)

Virtual reality (VR) is an immersive multimedia or computer simulation reality. This technology allows users to "enter" an environment and is designed to help users feel as if they are there. At the same time, users can also perform some interactive activities in this virtual environment.

Currently, this is a hot design direction. Also known as head mounted display (HMD) or VR glasses, both Google Cardboard and HTC Vive have designed hardware devices to make them better available.

Computer Generated VR (Computer-generated VR: CG VR)

As the name implies, it now turns to the concept of CG VR, computer-generated VR content (ie not from the real world). CG VR allows the user to directly see the pictures that can be rendered in real-time, but this way is not because the real-time rendering can not be interactive but the behaviour

occurs, the interaction is still allowed ("VR/AR/MR, what's the difference? | Virtual reality | Foundry", 2017). In addition, there is another VR form which is a combination of the two above. By merging the two content types, you can create an immersive experience, just like today's movies. Although this "third way of creation" has no exact name, most users are used to watching visual content combined with real-world and CG content("Full text of "Bibliotheek van Nederlandsche pamfletten verzameling van F. Muller"" , 2019).



Figure 44. AR application screen (Fernández, 2019)

Augmented Reality :(AR) (Figure 43)

Augmented reality is an expression that overlaps the real world and the content produced, but in fact the content produced is not directly in the actual environment, usually through a device with a display screen as a medium.

In the current design, more of the expression used in the game, we have seen a lot of games using this technology, for example, lego uses this technology to make a lot of applications that can be used with the building blocks.



Figure 45. MR screen ("YouTube", 2017)

Mixed reality :(MR) (Figure 44)

Mixed reality is a technology that combines computer-generated graphics or animations or interactive images with the real world. The key feature of MR is that synthetic content can interact with real-world content in real time (Policy, n.d.)

Hardware related to mixed reality includes Microsoft's HoloLens ("VR/AR/MR, what's the difference? | Virtual reality | Foundry", 2017)[8]. Although Microsoft is trying to introduce another term "holographic calculation" to circumvent the AR/MR debate, it is still very popular in the MR field. Currently, Microsoft has just launched the HoloLens emulator for developers, and now we can develop applications for new technologies.

3.1.1.3 IOT (internet of things)

The period when PC is the main carrier is the first stage of Internet development. The period when smartphones are the main carrier is the second stage of Internet development, and now it has officially entered the third stage of network development, namely the Internet of Things. At this stage, the carrier of the Internet can be everything. The essence of the Internet of Things is still the Internet, but only IOT disseminates information through the Internet and mutual perception.

3.1.1.4 Artificial Intelligence (AI) (Figure 45)

Artificial intelligence is undoubtedly one of the most discussed technologies in the past 10 years. We can

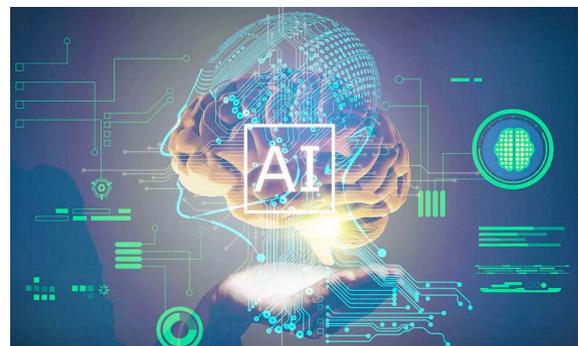


Figure 46. AI schematic diagram (artificial intelligence in medicine - Google, z.d., pp. 1-3)

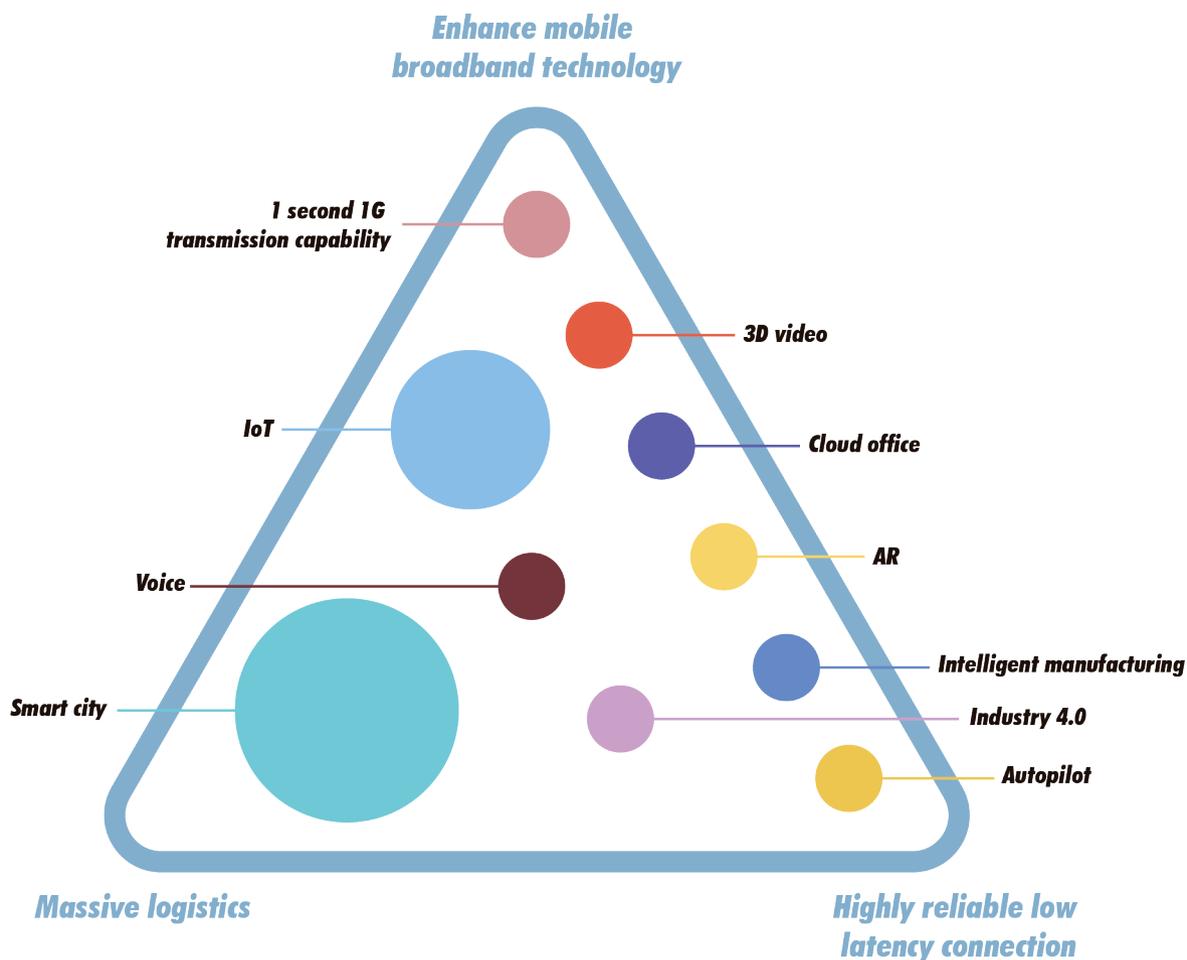


Table 25. Distribution of the impact of 5g on the development of modern technology

divide artificial intelligence into "artificial intelligence" and "intelligence". The reason why people are so "fear" or contradictory to such a technology that can have a huge impact on human beings is that artificial intelligence has developed into a self-learning and self-growth. The technology, but it is well known that this is a human characteristic, then is it possible for such a robot to control its own consciousness without being controlled by humans?

Nowadays, this technology is extremely tightly controlled by governments and is used more in the field of robotics, such

as intelligent computing and intelligent control. (Table 25)

The new technology is as described above, and the emergence of 5G technology now has some impetus for some of the above technologies, and these pushes are positive. ("5G is coming! What is the impact on the designer?", 2019)

3.3 Conclusion

In this paragraph, our core discussion is related to technology, technology is changing, and the means of interaction is also developing with the development of technology.

In this section, it can summarise as:

1. The modern means of interaction-based on input and output. The methods of input and output can be used interchangeably to form an interactive technique.
2. The degree of use of the app by modern people is high. An enjoyable means of information output for contemporary people is to use interface interaction means.

3. There have been a lot of apps that use new ways of interacting. They have brought us a lot of new experiences, especially those that can't easily experience in ordinary life.

4. Technological innovation has dramatically developed in the past five years. The latest 5G technology is the core of many new technologies and the conditions for improvement.

5. New technologies have unique applications in interactive means, reflecting the new experience brought by the fast transmission speed and the development of the information quality of transmission.

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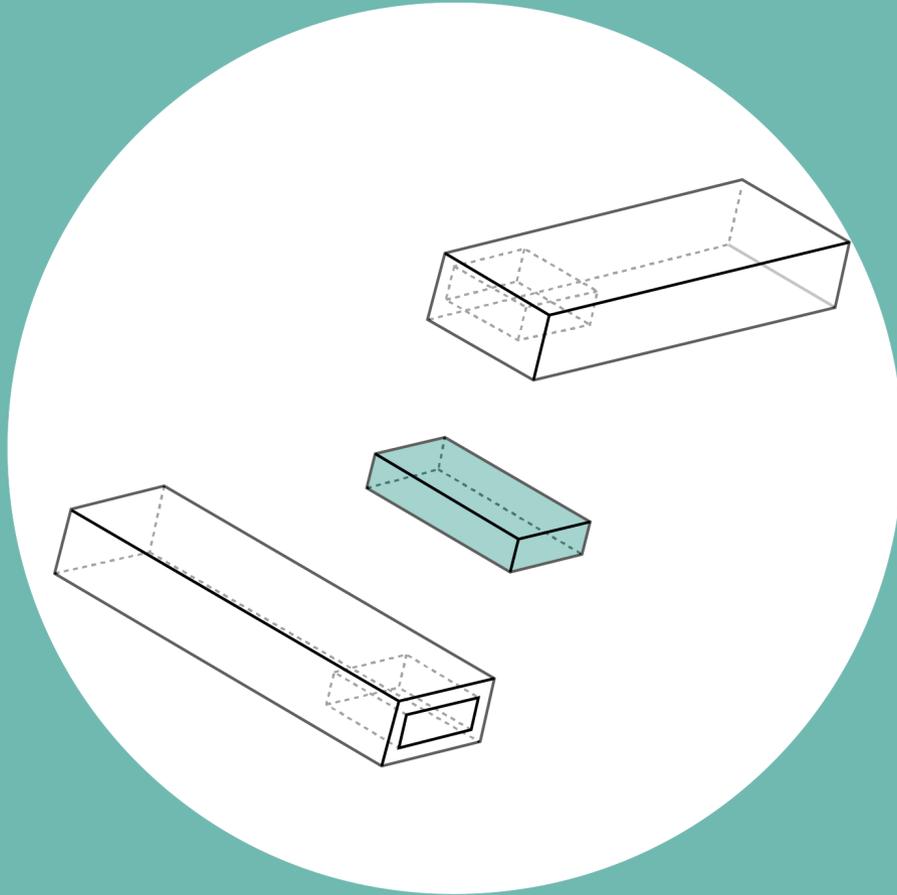
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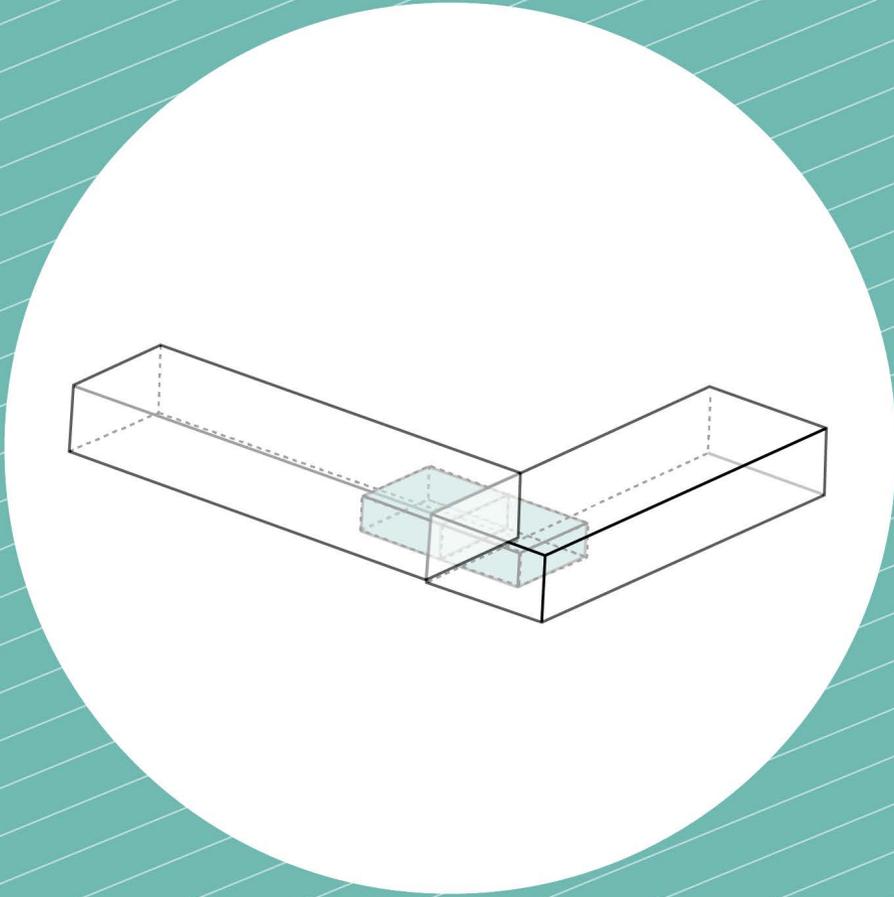
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ABOUT USERS 4

4.1 Reasons for crowd selection

In this section, we will select and analyse our users. The way of analysis respects the basic theory of ethnographic analysis. We use the population of museums visited by Italy as the background of investigation and analysis, and collect a series of data from the distribution of regions, gender, education level and age distribution. the study.

In the figure below, we will see the distribution of museum visitors in each region, data from Statistics on visits to museums in the various areas of Italy per month, 2018 (table 26). As can be seen from the chart, more visitors are concentrated in Lazio, Campania, Tuscany and Piedmont, accounting for almost half of the total number of visitors. These regions are characterised by a more concentrated collection of museums and more history. From the table, we can also see that the total number of people in the region at the end of the year only reached 80,000 people,

which is far lower than the average number of visitors to the Italian museum. And the gap in education is also huge. It can be seen from Table 27 that there are more people with bachelor degrees and museums, and more than half of the people with high school education or above have visited museums. The proportion of visitors to the lower population is also lower. This is of considerable significance to the classification of our project population. Since we hope that more people will see our projects, more people can be understood as having at least a high school education. At the same time, the proportion of visitors is also impressive. It can be analysed through Table 28 that the population aged 18-19, there should be more people visiting the museum, and the users in this age group are generally Technology. New things maintain a higher level of interest and have the ability to accept new knowledge more quickly. The proportion of younger children is also

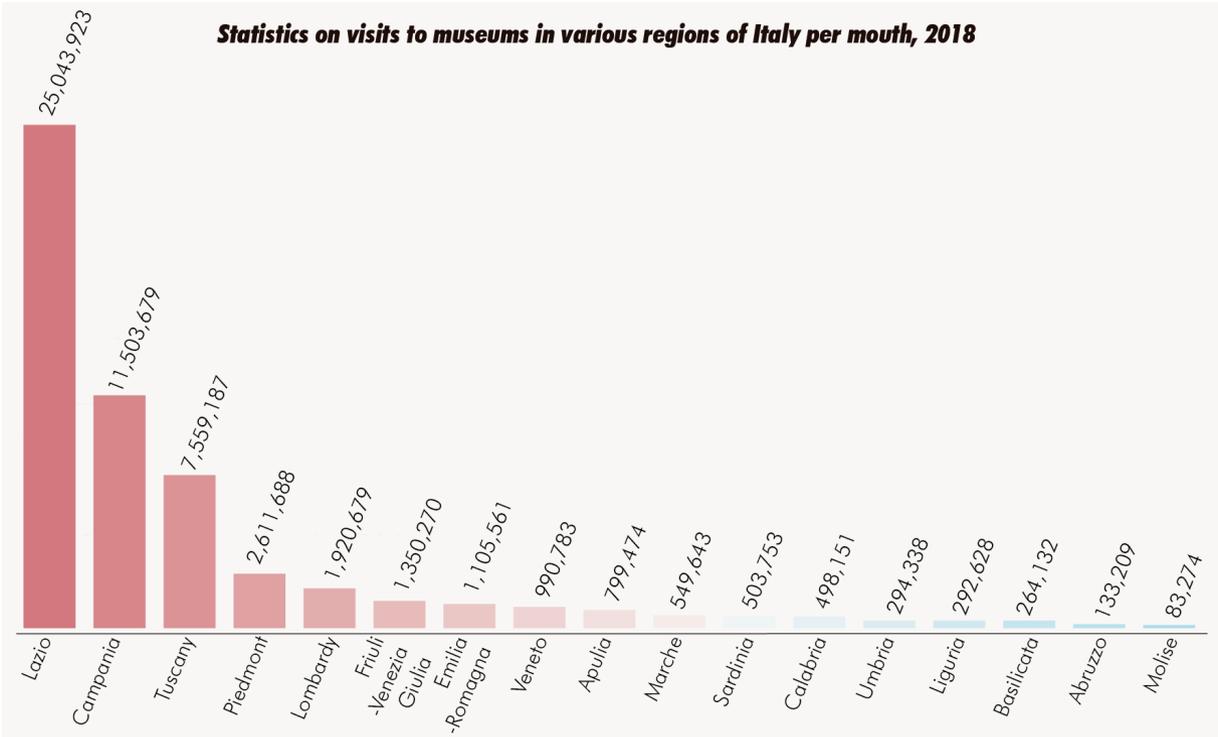


Table 26. Statistics on visits to museums in various regions of Italy per month, 2018

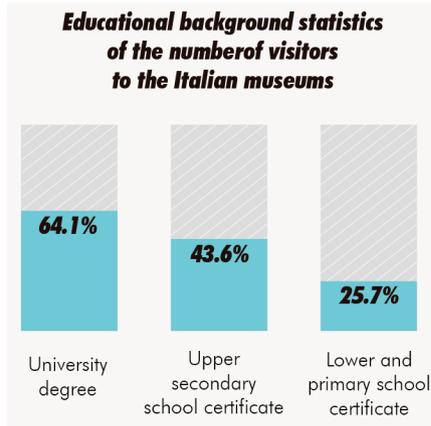


Table 27. Educational background statistics of the number of visitors to the Italian museums

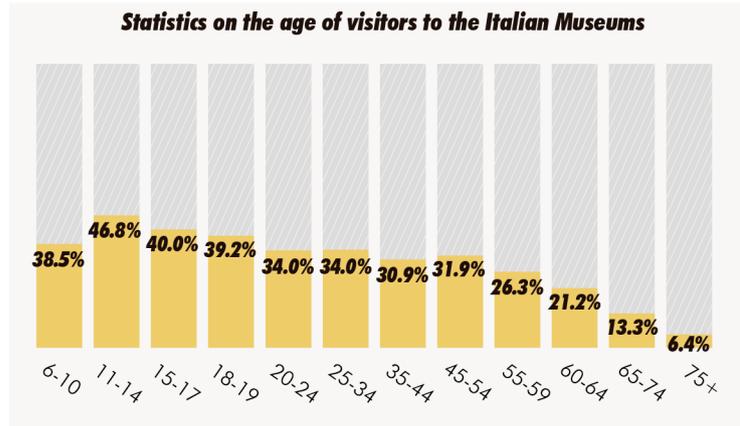


Table 28. Statistics on the age of visitors to the Italian museums

considerable. Still, because of children’s understanding and height limitations, we do not include this group in our user portrait is considered within the scope. Also, we can see that the ages of data between the ages of 25-34 and 45-54 are the largest, which almost indicates that such people are less frequent to go to museums due to time cost and working hours. Besides, in the analysis of the number of visitors to the museum, the ratio of male to female is the same; there is no apparent difference (Table 28).

Through the above data listing and analysis, we will

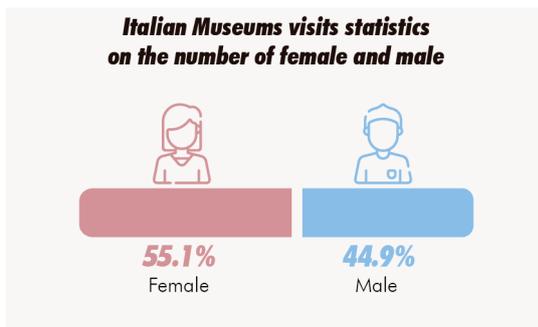


Table 29. Italian museums visits statistics on the number of female and male

summarise the characteristics of our primary users:

- 1- Have a high level of education and good cultural understanding and understanding;
- 2- Cities from the central and further north;
- The 3-age layer is mainly concentrated in 18-24 years old;
- 4- Interested in visits or museums, and there are many visits during the year.

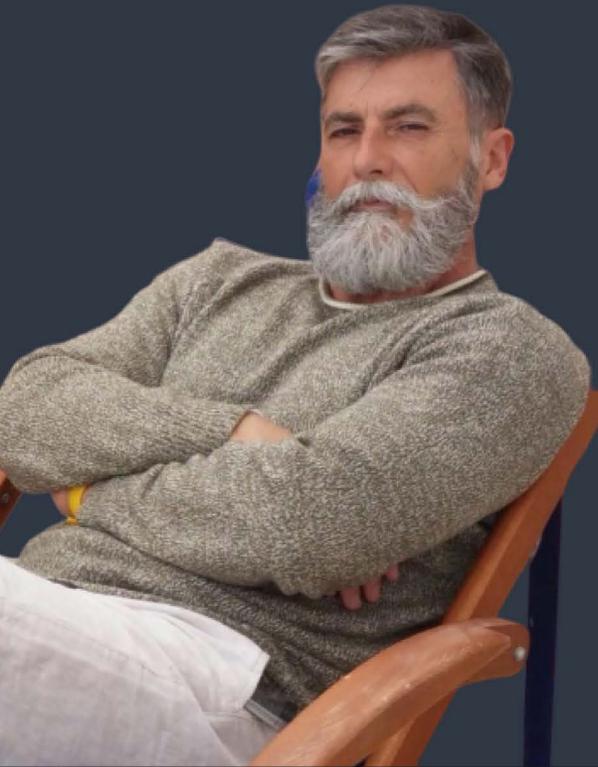
The main characteristics of secondary users are:

- 1- The level of education is balanced, with an excellent cultural background and understanding;
- 2- From the central or northern cities;
- 3- Age is concentrated between 35-44 years old;
- 4- Family members with younger children need frequent visits or related visits.

The main characteristics of the reverse user are:

- 1- The level of education is lacking or below average;
- 2- From other regions;
- 3- The age level is higher, and there is no need to accompany young children to visit;
- 4- There is no initiative in attending the tour.

4.2 User portfolio



MONNI NICOLA

Bar owner

ABOUT

-  age: 63 years old
-  incomes: 3000 euro/month
-  education: high school

HOBBIES

Like to travel and vacation, he will spend at least three times a year with his girlfriend. And like to meet up with friends to drink and chat in their bar.

CHARACTERS



RELATIONS

After divorcing his ex-wife, he lived with his son and his new girlfriend in a house near bar, and bar was operating with his son. At present, the focus of the operation is gradually transferred to the son.

ABOUT TECH

He doesn't like the changes brought about by new technology, and he still uses old-fashioned button phones. Although technology is not a contradiction, it does not actively touch new technologies, and feels that new technologies are difficult to understand.

TIMETABLE

for BAR
from Monday to Sunday:
7:30 a.m ---- 7:30 p.m
for MONNI
No fixed working hours

Figure 47. User portrait-Monni Nicola

4.2.1 Monni Nicola

The first user was an ordinary Italian middle-aged man who owned a small bar and worked with his son. At the same time, he lives with his girlfriend in a place close to the bar. His bar is in the centre of Turin city, near Piazza Castello, which is an essential and famous square, so this bar is bustling and crowded.

The working hours of the day are free and do not need to work in the bar all the time. The focus of work has gradually

shifted to his son, so now MONNI goes out on vacation with his girlfriend every year. The number of holidays is more than three times, and most of them are natural scenery.

For the use of technology, MONNI does not like it. He believes that technology is lazy, so the most straightforward button phone instead of a smartphone has been used so far. The high-tech exhibits that appear during the visit are just onlookers and will not take the initiative to try and understand.



CHIARA SCARPA

Student

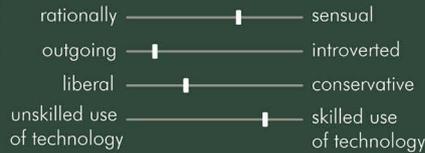
ABOUT

-  age: 22 years old
-  incomes: 400 euro/month (family support)
incomes: 300 euro/month (parttime job)
-  education: bachelor

HOBBIES

She likes to play games (overwatch), and enjoys watching various exhibitions and participating in school exhibitions.

CHARACTERS



RELATIONS

The second year of the undergraduate course began to rent a house in Turin, the roommate is a Chinese girl and a Colombian boy. Always eat with your roommates and discuss the culture of your country.

ABOUT TECH

Because she is a student who studies art history, she is willing to contact a variety of new technologies and national cultures. Frequent participation in various exhibitions will also be exposed to the latest interactive technologies and exhibition methods.

TIMETABLE

from Monday to Friday:
depends on the lessons' schedule
weekends:
occasionally needs to teach children to learn to draw

Figure 48. User portrait-Chiara Scarpa

4.2.2 Chiara Scarpa

The second user is a student of art history in the second year of the Accademia Albertina di Belle Arti di Torino. Living in Susa Town, it is inconvenient and time-consuming to take a train every day in the first year, so she rented a house in Turin in the second year. The house is shared, and the roommate is a Chinese student and a Colombian student. Chinese girls study decorative design, Colombian male students study prints, so three people often discuss their professions, and will discuss the culture and history of

their respective countries, to give each other some creative inspiration. Chiara loves literature, and she often visits some art exhibitions as well as some museums. In her spare time, she also teaches students how to draw so that she can earn some money. Chiara also likes to play games, so technology products will inevitably be used. But at the same time, she is interested in technology, she will take the initiative to participate in technology exhibitions and understand the latest technological developments.



ALESSIO GOZZI

Courier

ABOUT

-  age: 42 years old
-  incomes: 1500 euro/month
-  education: high school

HOBBIES

The biggest hobby is buying lottery tickets. The second is to meet with friends on a rest day every week to go to the bar to drink and watch football matches together.

CHARACTERS



RELATIONS

He has two sons, one is 10 years old and the other is 7 years old. The wife is working as a cashier in the supermarket. Wife's income is not very high.

ABOUT TECH

He can accept simple technology products, such as the use of smart phones and smart appliances (fully automatic washing machines and television), but does not fully accept new technologies.

TIMETABLE

from Monday to Friday:
8:00 a.m.-18:00 p.m
weekends :free

Figure 49. User portrait-Alessio Gozzi

4.2.3 Alessio Gozzi

Alessio Gozzi is the father of two children. He is working as a courier. The time he works every day is very long, so his wife complains that he can't accompany his children often, on weekends, he takes as many children as possible instead of staying at home. He will take the children to visit the exhibition when he has time, but the activities of these exhibitions are just hope. Children can gain more

knowledge. He is not interested in himself. He can't even tell who works and what genre. His hobbies are buying lottery tickets and watching a game with friends.

His attitude towards technology is ordinary. He does not feel that it is necessary, nor does he feel that it is boring, but he does not understand technology, so he does not understand some new things, and does not know how to use or use it. There are difficulties in the process.

4.3 Conclusion

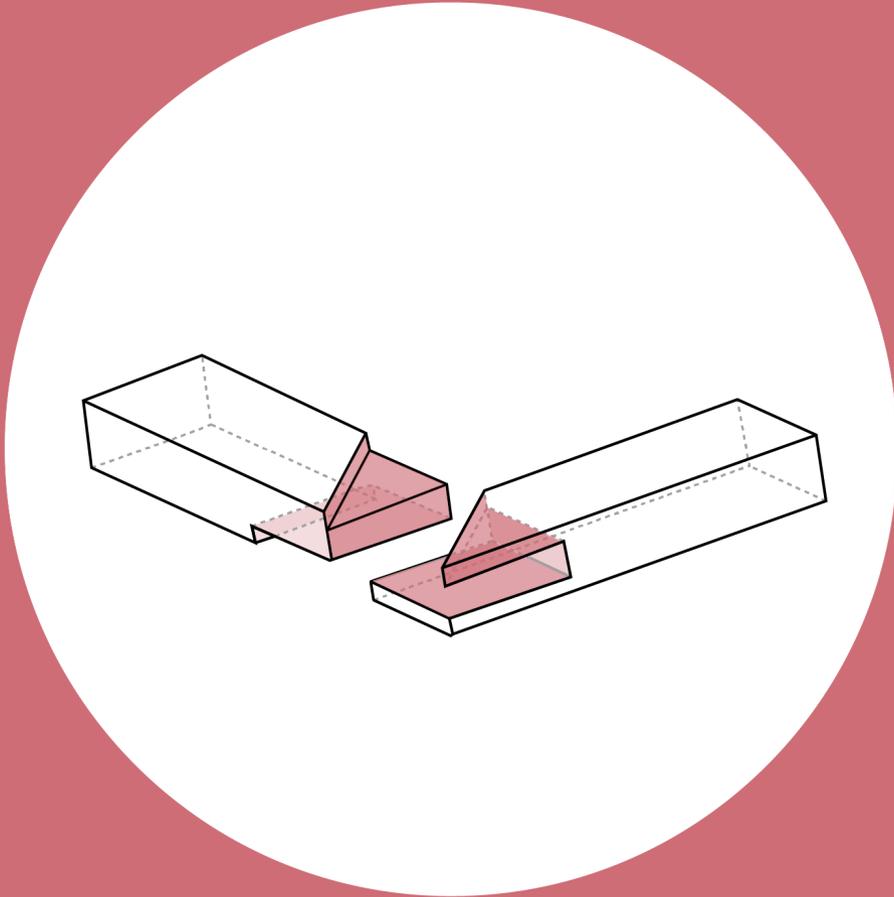
We have developed three users from the user data of the Piemonte region as the target of our research. The data comes from the museum-related behaviours of the people in the area, and we classify them into three individual categories, namely: 1-love technology, and are

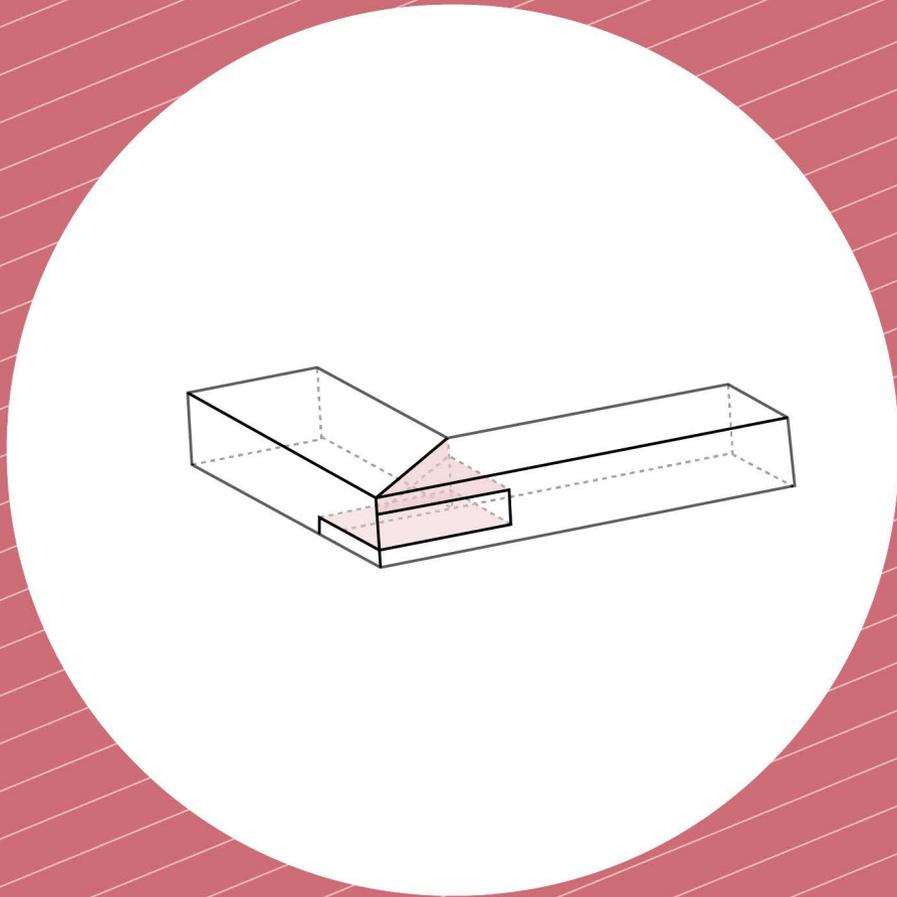
happy to learn new cultural information; 2- not exclusive to technology, but will not take the initiative to contact; - exclusion of technology, and will not actively accept further information.

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PROJECT OBJECTIVE **5**

5.1 What we want to do?

5.1.1 The craft of Mortise and Tenon

After four chapters of research and analysis, we began to pay more attention to this cultural element --the structure of mortise and Tenon.

Mortise and Tenon, written as 榫卯, pronounced s ŭ n m ǎ o, the Mortise and Tenon structure is a standard method in which solid wood furniture usually adopts a concave-convex treatment on the two connected members. The concave part is called Mortise (卯, pronounced m ǎ o); The convex portion is called Tenon (榫, pronounced s ŭ n). The structure of the Mortise and Tenon originated very early. In the Hemudu Cultural Relics Site of about 7,000 years ago in Yuyao, Zhejiang, a large number of intact relics with structures of Mortise and Tenon have been excavated. We can say that this is a great invention in the history of Chinese wood technology.

5.1.2 The unique advantages of structure of mortise and tenon in the application

As we have seen, especially in the first chapter, we have already detailed what the structure or Mortise and Tenon is. In real applications, the construction or Mortise and Tenon also have many advantages that cannot be replaced.

1. The fabric or Mortise and Tenon is a heritage of culture and spirit. The study found that the Chinese have used the construction or Mortise and Tenon for more than 7,000 years. Historically, the structure or Mortise and Tenon is enough to call it a unique craft art that can represent the Chinese nation. For more than 70 centuries, this art process has been continuously developed and re-created, and its technology and craftsmanship have been quite sophisticated. Therefore, it can be said that the metal

parts in Chinese furniture are not used, which is not only a requirement for the process but also a tradition. And this is also the advantage of Chinese furniture. We can think that this structure is the core of traditional Chinese furniture.

2. the furniture with the combination of the construction or Mortise and Tenon is more durable. Metals components tend to rust or oxidise, while real furniture with the structure or Mortise and Tenon can be used for hundreds or thousands of years. Many Ming-Dynasty-style furniture has been around for hundreds of years, and although they are alterations, the structure of the furniture is as hard as ever. If such furniture is assembled with nails, the wood is likely intact, but the furniture is scattered due to corrosion, fatigue, aging of the connected metal.

3. Furniture and products with the structure or Mortise and Tenon are more comfortable to transport. Many mahogany furniture and products are disassembled and transported and assembled at the destination. This type of transportation is very convenient. If the nails are used to connect the furniture, although some products can be disassembled and then transported, the furniture such as chairs with too many small wooden pieces can not meet this standard.

4. Furniture and products with the structure or Mortise and Tenon are more comfortable to be repaired. Regardless of which furniture or product you use, there are problems with long-term use that require maintenance and care. But classic mahogany furniture can be used for hundreds of thousands of years. For example, if a particular structure is broken and needs to be replaced, the corresponding replacement component can be made by the wood with similar properties. It is more challenging to make such disassembly and replacement of furniture connected by metal parts. It is even necessary to disassemble the furniture completely, which will cause further damage to the furniture.

5. The structure or Mortise and Tenon does not harm wood or destroy the forest. A lot of wood is very precious and scarce. Rusting of metal parts can contaminate valuable

lumber. Besides, metal parts can also damage the wood, which can easily cause cracking of the wood when it is inlaid. For example, if mahogany wood, which is often used

for traditional Chinese furniture, are forcibly nailed by metal components such as nails, which will cause the wood to split.

5.2 Why we choose Mortise and Tenon?

Here we will explain in detail from three aspects why we chose the structure of Mortise and Tenon as project objective.

5.2.1 Wide range of applications

Mortise and Tenon art is not on the UNESCO's Lists of Intangible Cultural Heritage and the Register of good safeguarding practices, but traditional Chinese architecture art. The application of Mortise and Tenon not only appears in architecture but also in various products such as furniture or stationery (it is not like textile technology or engraving technology, their application direction is relatively simple). So this side shows that there's more application and more plasticity of Mortise and Tenon. It has more impact on life than we thought.

The various practices of Mortise and Tenon are different, and the scope of application is different. We can see the structure of Mortise and Tenon in both Chinese wood construction and furniture. But in architecture and furniture, the technology of the structure Mortise and Tenon is

different. In architecture, it is more demanding that the structure needs to be structurally stable. Because the structure of Mortise and Tenon can be opened in several directions, the structure of Mortise and Tenon can achieve the force of combining different directions at the same point, so that when folded, it becomes a perfect whole with high strength.

The structure of Mortise and Tenon in the furniture reflects Chinese's implicit and restrained aesthetics. The furniture has a complete and straightforward appearance, but the interior of the furniture contains complex structures. These complex structures are not revealed. You shall understand the ingenuity of the internal structure of the furniture only when you carefully appreciate and learn about it. It is like the Chinese prefer the cautious and subtle character. Chinese furniture designers don't show complex structures, just as they don't quickly reveal their abilities and personality. In the furniture, the joints of the cymbals have a slightly free space because of the structure of Mortise and Tenon. When all components are combined, the furniture will have a complex and delicate balance. The wood used to make the home itself has been extended, and the unique toughness of the enamel structure makes the furniture more stable and durable and is less prone to breakage.



Figure 50. The structure of mortise and tenon at this chair (remade by author)

5.2.2 Widespread throughout the world

The structure of Mortise and Tenon not only appears in China but also in Europe. We can also see the elements of the structure of Mortise and Tenon in old Italian traditional furniture. So western people are acceptable and have been accepted the construction of Mortise and Tenon. But China's formation of Mortise and Tenon is different from that of Europe. This situation provides us with more starting points.

Italy has held a prominent place in furniture design for centuries.

Most of the earliest known pieces of Italian furniture were Roman adaptations of Greek designs. Bronze and wood furniture of the first century was found in the ruins of Pompeii and Herculaneum. Further evidence of early Italian furniture is found in paintings and carvings. Furniture frames were made of bronze or wood and accented with precious metals, tortoiseshell, and ivory details.

In the old traditional furniture of Italy, especially the wooden furniture, we can also see the shadow of the structure of mortise and tenon.

This is a beautiful Italian wooden "Dante" style chair from the early 20th century. This pair of antique chairs feature a Dante-style x-frame ("Pair Italian Wooden Dante Chairs | 297 | A. Tyner Antiques," 2019).

Here we show the structure of mortise and tenon at the part of the foot of this chair. (Figure 49)

This is an Italian 13th-century Coffret ("Coffret | Italian | The Met," 2019) made of Walnut and carved & lined with glass (some coloured), it measures 24.8 x 50.2 x 21.3 cm. Unfortunately, it has been a bit broken, but because of its damage, we can more clearly see its internal combination structure (Figure 50). As can be seen in the figure, in addition to the movable doors that are connected by metal parts, we can see especially the inactive joints, which have many elements of the structure.

It may be one of the oldest construction techniques in the world. Near the German city of Leipzig, archaeologists



Figure 51. Internal combination structure of an Italian 13th-century Coffret (Coffret, 2019)



Figure 52. The structure of mortise and tenon appearing in ancient French buildings (Mortise and Tenon joints - Penchard, 2018)

discovered the oldest preserved wood-frame architecture in the world. The figure shows us the structure of mortise and tenon appearing in ancient French buildings. (Figure 51)

It can be seen that the construction of mortise and tenon not only appears in China, but also in Europe, and even appears extensively in ancient and modern furniture and architecture in Europe. But the structure of mortise and tenon is not promoted as a cultural or artistic element in Europe. Because the construction of mortise and tenon is not the only way to make buildings and furniture in Europe. In the production of furniture, a large number of metal components are usually used, but the structure of mortise and tenon is used less. At the same time, there are many differences between the construction of mortise and tenon in Europe and China: compared to in China, the structure of mortise and tenon in Europe is relatively simple. This is also because the industrial revolution has less impact on China, and China is more dependent on Craftsman, especially on the art of furniture and construction. For various reasons, a variety of the structure of mortise and tenon has emerged in China. This difference between Europe and China is also a

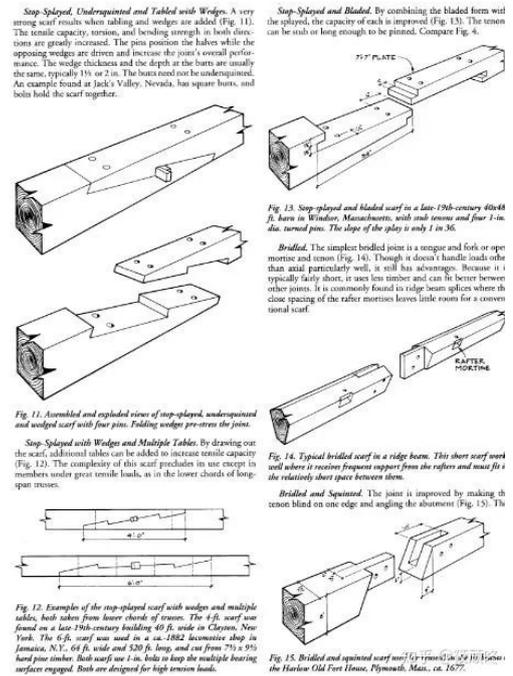


Figure 53. The structure of mortise and tenon in the early 19th century from America (Furniture - History, n.d.)

reminder that it is necessary to promote and disseminate the traditional Chinese structure in Europe.

We can see that although the structure of mortise and tenon is less mentioned in Europe, it appears widely in ancient and modern life. More and more people in the world have accepted it, but it has not received the attention it deserves.

Regarding the origin of the structure of mortise and tenon, there is no concrete conclusion of the test. The German-speaking part of Europe was unearthed 7,000 years ago. The ancient Egyptian "Khufu boat" before 4500 years ago, although it is not a real sailing ship, it is only a funerary of Pharaoh, accurately only a model. Still, there are also many skeleton structures in the structure of the vessel. In the Stone Age without metal tools, people around the world can only shelter from the wind and rain by using cave dwellings and nesting. And these two ways of living are inevitably dealing with wood. Therefore, in the long-term practice, people naturally master technology. Until now, there is no accurate sound that defines the time of the origin of the structure. This is also because the definition of the construction of

Comparison of furniture structure in different countries at the same time

16th Century, English Elizabethan Oak Center or Dining Table



Detail



*Metal components can be found in the circled area.

16th century, late Ming Dynasty, Dalbergia odorifera table



Detail



Figure 54. Comparison of furniture structure in different countries at the same time (remade by author) (||| sotheby's hk0640lot8tqd5zh, n.d.) (16th Century English Elizabethan Oak Center or Dining Table, n.d.)

mortise and tenon is extensive. So any woodworking connected with a concave part and a convex part can be called the creation of mortise and tenon.

The structure of mortise and tenon is not a Chinese patent. Many different civilisations in the world spontaneously produce a diverse structure of mortise and tenon of their nation. But the structure of each region has different characteristics. Even the Americans, who were only two hundred years old, developed their own technology of the structure of mortise and tenon in the early 19th century (Figure 52) (equivalent to the late Qing Dynasty in China) is widely used in residential buildings and has been developed to this day(perhaps from the British or European continent) . However, we can see from the data that the know-how

of American wooden buildings is obviously not a type of ancient Chinese architecture and there are not same types of the structure of mortise and tenon. Here our project is mainly aimed at the traditional Chinese structure of mortise and tenon. In the application of structure of mortise and tenon, each country has different ways of using it. Here we will understand better by comparing the two pieces of furniture of 16th century from China and the UK.

As can be seen from the figure, in addition to the different styles of furniture, traditional Chinese furniture uses almost only the structure of mortise and tenon, while the British contemporary furniture uses metal components in addition to the formation of mortise and tenon. (Figure 53) This subtle difference also shows that the construction of mortise and

tenon used in traditional Chinese furniture requires higher requirements. The contrast of structure of mortise and tenon is precisely what we want to know and explore, and to spread and exhibit.

5.2.3 The current poor situation of displaying and spreading

From the current situation of the craft exhibitions in China and Western countries, compared with other handicraft techniques, the craftsmanship of the structure of mortise and tenon art has a lack of display opportunities.

In the second chapter, we examined in detail the current status of the spread of three handicrafts, including the handicrafts of mortise and tenon in China. The range of each craft has its problems. What makes us more noticeable is the current state of the spread of the structure of mortise and tenon. The Mahogany Furniture Museum, the Museum of Traditional Chinese Architecture and the Precious Wood Museum are widely seen in China. Still, there are not museums dedicated to the display of handicrafts of the structure of mortise and tenon. Most of these museums are private. This can reflect that even national institutions are

not doing an excellent job of protecting, publicizing and disseminating handicrafts of the structure of mortise and tenon.

It is not well spread in Europe whether it is in the European-style craft of mortise and tenon technology or the Chinese-style work of mortise and tenon technology. It can be seen that the dissemination and publicity of handicrafts of mortise and tenon are essential.

However, in this relatively weak communication situation, taking China as an example, there has been more and more activities focusing on the handicrafts of mortise and tenon, such as an app that we mentioned in the paper to introduce the structure of mortise and tenon. The emergence of these activities and apps shows us that the promotion of structural crafts of mortise and tenon is increasingly needed. More and more people are beginning to invest in this construction, and more and more people are starting to want to pay more attention to and prefer to understand the handicrafts of mortise and tenon. There is a massive difference between the demand for cultural markets and the situation of cultural development, and this difference is the driving force that urges us to continue to carry out deeper publicizing and disseminating handicrafts of the structure of mortise and tenon.

5.3 Conclusion

This chapter comprehensively explains why we choose the craft of mortise and tenon as our project goal from two levels and four points.

First of all, because of its unique characteristics in the application of furniture and construction: it has reliable cultural attributes, practicality, the property of more accessible transportation and the aspect of easier maintenance. Secondly, it is horizontally compared with other similar handicraft: the handicrafts of the structure

of mortise and tenon are widely used in more products; it has appeared to vary degrees in other countries including China; the current displaying situation of handicrafts of mortise and tenon is even worse.

In summary, we are more inclined to carry out the dissemination and publicity work of handicrafts of the structure of mortise and tenon. And its demand for communication and publicity is even greater

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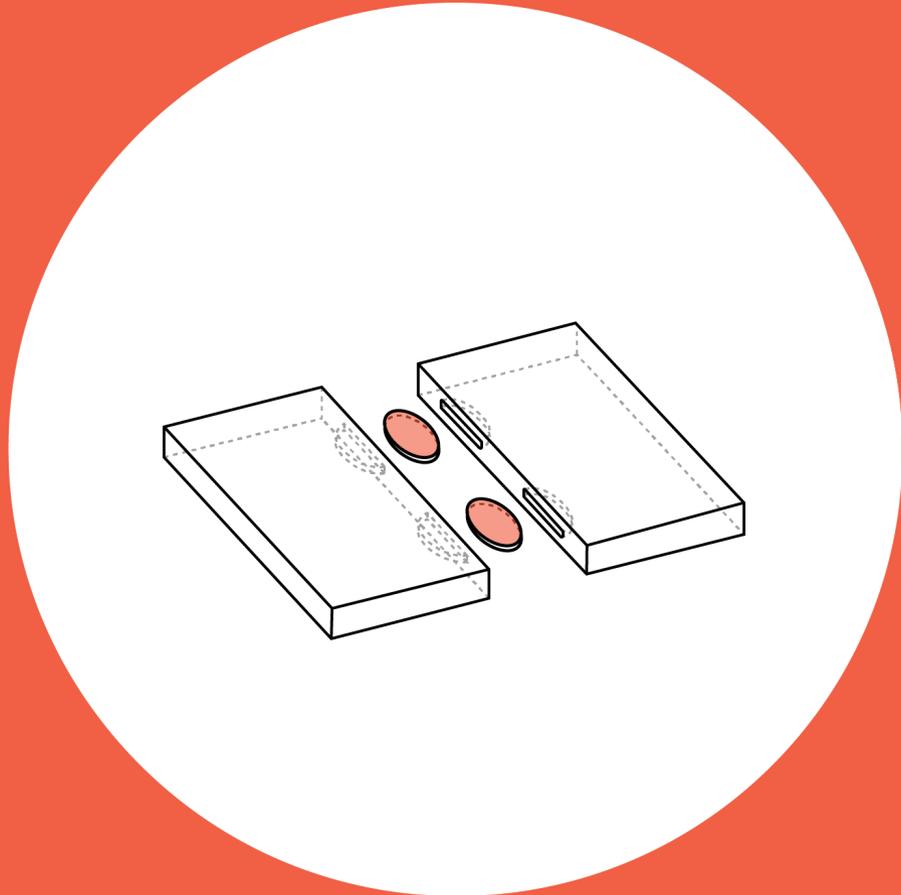
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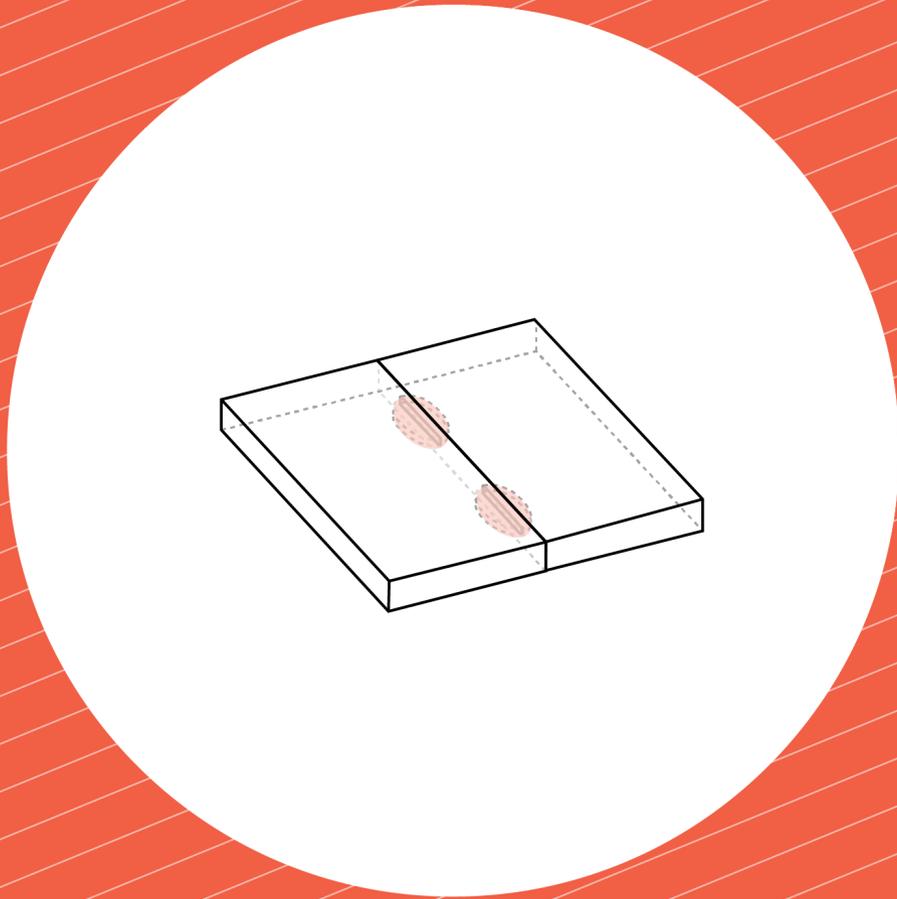
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CONCEPT **6**

6.1 Concept inspiration

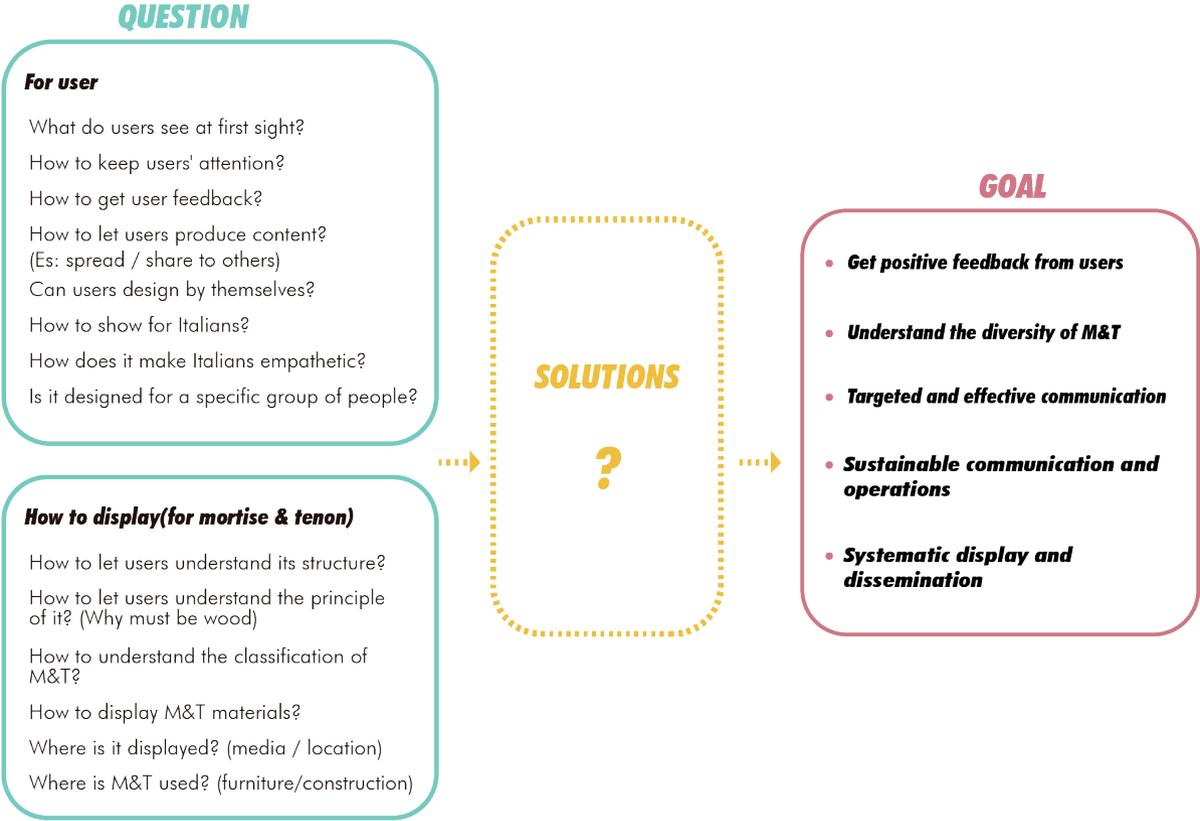


Table 30. Concept inspiration

In this chapter, we will start to talk about our concept, and we will use a storytelling way to present our planning logic for the project.

The questions we asked came from two primary directions. The first is about users, how the users will interact with our project and because users are Italians, so how to present to them is one of the most critical questions that we need to solve.

At the same time, we also put forward some other questions for users, such as what kind of content we want users to see at first sight. This is the core issue we think because this is the way to grasp the curiosity of users, users are After walking through the streets, why stop here or visit here and

learn about traditional Chinese handicrafts? This is thought-provoking. Another exciting thing is that we also want to get useful user feedback, because it can "detect" whether the user really understands what we want to show, which also ensures that we can make some corrections smoothly, to help other users better understand our projects.

For the mortise & tenon (in the next part we will say it in short as M&T) region, we make some questions are about the display way. First is how to lets users understand its structure. This is the leading soul of our project, which is what we want to show to the Italians. And then is how to display the materials of the M&T, as we have explained in the first chapters, M&T always made in woods in China, but

in recent years it also could be made in plastics, acrylic or even the paper. But we need to explain that the traditional M&T are created in wood. We need to compare all the types all of the world, lets the users clarify which kinds of M&T are made by China o by Italy.

To our distinct goals, the first is to get positive feedback from users, and it could be connected with our questions for users. But it has a problem we do not have an exact solution, this part we make an empty box there to waiting

for us to fill it full. And the next goal is to lets users know the diversity of M&T, this could be analysed as M&T is just a module to combine different parts to complete a whole work, which can be furniture or architecture, or even a small box for jewellery. The next is about the target and effective communication, which we want to let the Italians understand M&T because we want to display our project in Italy, so this kind of scientific and effective communication is critical.

6.2 Cases studies and project inspiration

In this part, we follow the inspiration of our concept's flow, we start to find out which kind of way is actually interesting or attractive to the users, so here we select more than 10

cases studies to analysis them and divide the inspiration we need from the middle.

1- Land Lines

[Graphics, Visual attraction, Imagination]

this is from google map, this website allows a user to draw a simple line or o connected line, and the website will match a place which has the same curve. This is an interesting way to communicate with people, it will never limit the user's imagination and always give them a kind of surprise. Even it just a map, but it also lets people know how big the world and how the possibility of the world.

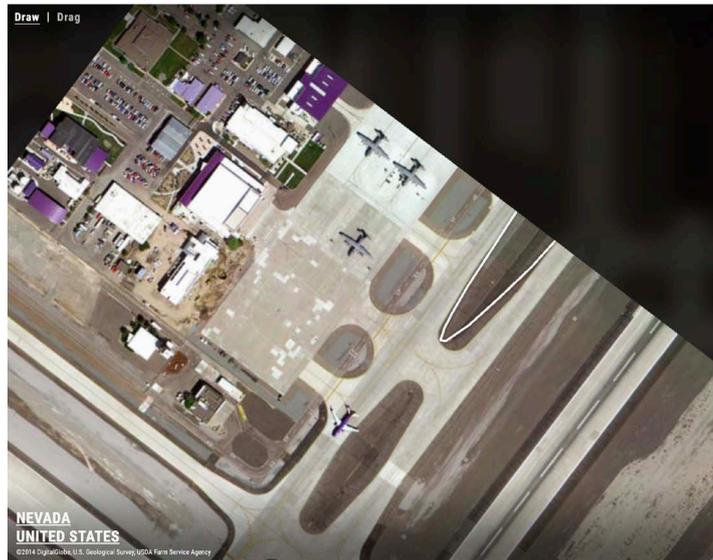


Figure 55. Screenshot from land lines ("Land Lines", z.d.)

2-from black mirror

[Portable device, Technology, Vision]

Black Mirror is a TV series produced by Netflix and in 2018 they published this special set in Christmas called 'white Christmas', in this set people could shield others who they want, and they use a kind of technology ,the operating system implanted in the eyes, the user can directly complete the phone call, take a photo, etc.

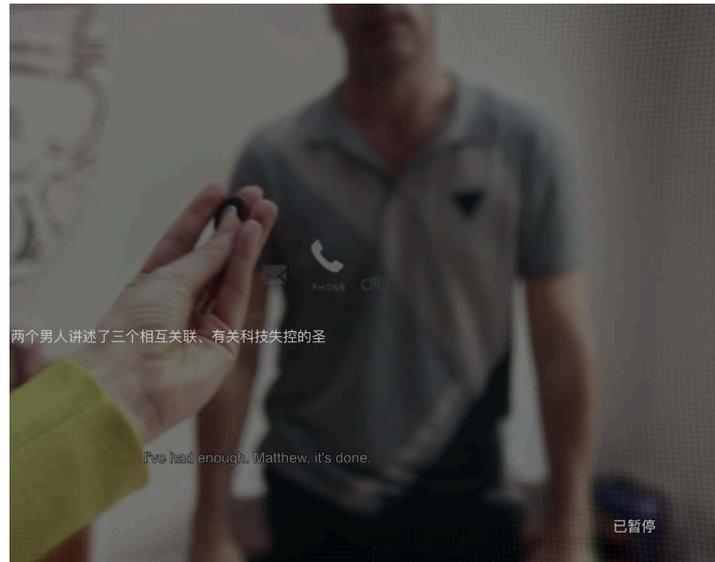


Figure 56. Screenshot from black mirror (Netflix,2014)

3-from The Avengers 2

[Internal structure, AI, Visualization]

In this movie, iron man has produced a man who used AI technology, and this screen is Iron man and Hulk were talking about how the Ultron be produced, they use this kind of technology can illustrate the structure inside of Ultron system. It is easy to see what inside and how it works.



Figure 57. screenshot from Avenger 2 (Avenger ,2015)

4- from our lesson 'design components'

[working principle, Internal structure, Design Components, Anatomy of the interior]

In 2018 academic year we have a lesson which is Design Components and in this class, we have done a practice, as we can see in the following photo, we take a product, and it has a cover that can hide almost part of elements, but we use some simple tools that can show of every elements inside of this product. In this practice, we could understand how this machine works and how it could be produced.

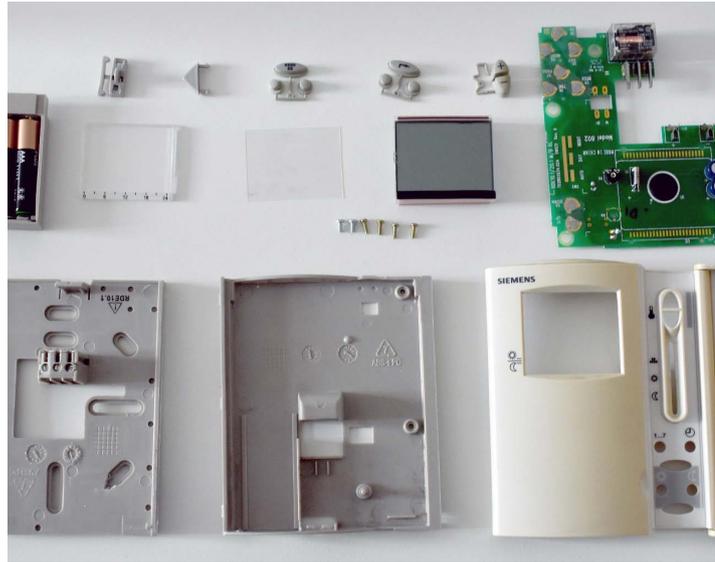


Figure 58. Design components class (Photo by Author)

5-from Copenhagen furniture museum

[entertainment, attracting, Comprehensive understanding, Experience]

In this museum, there are more than 100furnitures be presented, and this is a special mirror, it allows people to see her\himself in 360 degrees. And it is a good way to lets people have a space felling and an entertainment method to show off every corner of one person.



Figure 59. Mirror with 360 degrees (Photo by Author)

6- from La Biennale di Venezia (Russian showroom)

[Understanding, Display, Structural analysis]

This project also from La Biennale di Venezia, it is from the Russian showroom, it shows how the city developed, we can see in the left corner in this photo, there were three suspended display platforms with slope maps of the city, the author separating them from the ground, the ground and the underground.



Figure 60. Russian city model (Photo by Author)

7-from La Biennale di Venezia(Japan showroom)

[Conversion element, Visual attraction, Game, Playing, Learning in entertainment]

This project also from La Biennale di Venezia, but it was from Japan showroom, it was performed the ancient house from Japan, we can understand immediately what kind of elements they used and the quantities they used. It could be an interesting way to transfer Japanese building technology to visitors.



Figure 61. Lego of ancient house from Japan (Photo by Author)

8-from terrazza triennale

[Playing, Visual attraction, interactive]

This project will present a silhouette of the figure as people approach the projection wall, and will move as the person moves. Attract visitors to curiosity and try to think in the distance. Make visitors stay here for further understanding. But as a technical exhibition, it does not bring further understanding to visitors.



Figure 62. Terrazza triennale design (Photo by Author)

9- Digital design studios - universal everything

[Playing, Visual attraction, interactive, ai, Big data, sharing, analysis]

Universal Everything has created an interactive digital installation, 'Future You,' for the Barbican's AI: More than Human. At the entrance to the exhibition, visitors are greeted by a screen which acts as a mirror, reflecting a synthetic form that copies their movement and evolves to present (Colossal, 2019).



Figure 63. Universal everything (Colossal, 2019)

10 - WHAT MADE ME

[Proactively try, Visual information, feedback, Get information]

WHAT MADE ME was designed by Dorota Grabkowska for the Birmingham Made Me Design Expo (15-22 June 2012) at the Mailbox, Birmingham. (Behance.net, 2019)

This form can attract visitors and increase the participation of visitors, visualizing the emotions of visitors. It is also a feedback to the designer as a result of the research available.



Figure 64. WHAT MADE ME (Behance.net, 2019)

11-"TGC Small Program")

[Information data, fun, environmentally friendly design, sustainable, convenient]

At the Tencent Game Carnival in 2017, the first "Smart Seal" applet appeared (hereinafter referred to as "TGC Small Program"), which is the first large-scale exhibition program under Tencent. It provides information on activities, venue maps, In addition to ticket purchases and ticket giving, it also pioneered the interactive experience of smart stamps. (Love Fan Er, 2019)



Figure 65. TGC Small Program (Love Fan Er, 2019)

12-interactive media wall

[Playing, Visual attraction, interactive, Sound feedback system, flexible, simple media]

Music Playing Wall, a fun Interactive touch wall painted with instruments recognizes hand touch, plays the sound of instruments and maps colors. Children can easily play various kinds of instrument without physical constraints. An painting of musical instruments feels like a real instrument to play music. (Music Playing Wall, 2019)

Its advantages are: no restrictions on the environment, there is flexibility. Visitors can interact with a simple medium. The downside is that it affects the presentation of graphics when people interact with their projections.



Figure 66. Interactive media wall (Music Playing Wall, 2019)



Figure 67. Chinese Traditional Festival Three-Dimensional Book (Chinese Traditional Festival Three-Dimensional Book, n.d.)

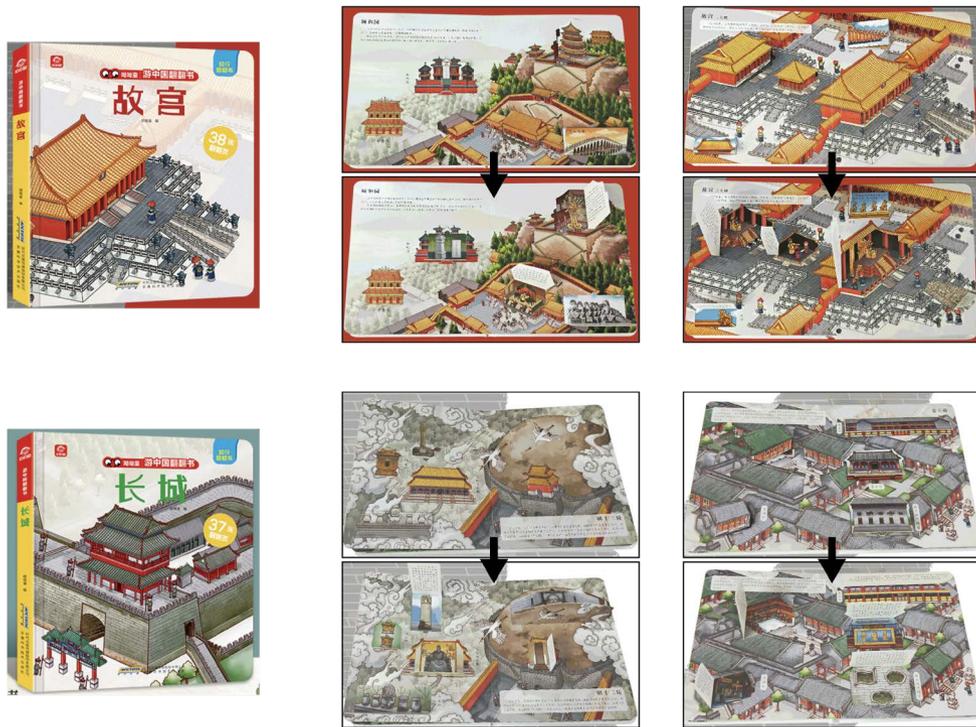


Figure 68. Chinese Traditional Festival Three-Dimensional Book (Three-dimensional book of the Forbidden City and the Great Wall, n.d.)

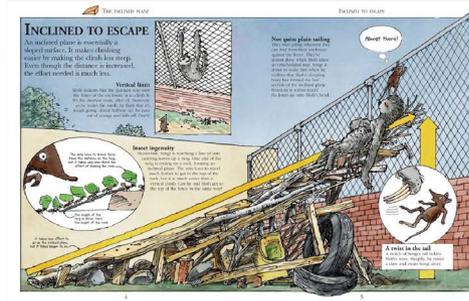
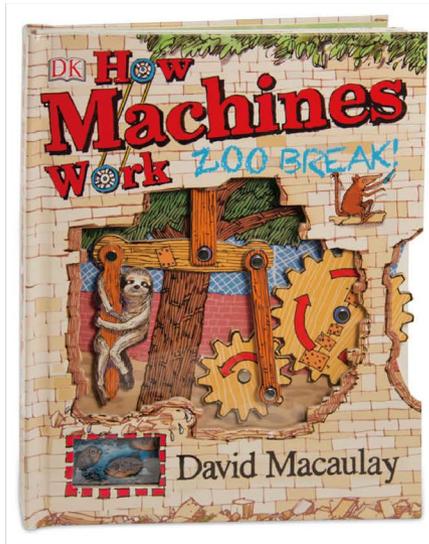


Figure 69. How Machines Work (How Machines Work, n.d.)

13- Books

[Visual attraction, Traditional culture, fun, Three-dimensional model]

Here we put together the Cases studies of all the books, as a reference and also can make a comparison.

This "Chinese Traditional Festival Three-Dimensional Book" (中国传统节日立体书) introduces 15 traditional Chinese festivals with 11 three-dimensional scenes. This book is aimed at children aged 3-10 and can learn traditional cultural knowledge while enjoying entertainment. There are three-dimensional cards in the book. When you open the book, the three-dimensional cards will expand in layers. It contains about 400 structures and has many structures that can be moved. This is a good way to show the details.

Similar to the previous book, this book is also a book

containing many activities. This series of books is a collection of architecture. The above book is about introducing the Forbidden City in China. The following book is about the Great Wall. In fact, not only Chinese architecture, but all buildings are a complex structure. This book introduces the external and internal structure of Chinese architecture through various activity structures. This is a good way to display traditional culture.

In fact, there are many books of the same type, this one is DK's How Machines Work: Zoo Break by David Macaulay. The book is full of detailed drawings to help explain the physical concept. There are also many movable 3D models and movable parts in the book. These interesting elements help children better understand how the machine works while they are entertaining.

5.3 Conclusion

In this chapter, we summarise the guidelines of our project through the above five sections and summarise our concept by comparing the relationship between the guidelines and our target. The thought is a system design that uses communication technology as a premise to generate more communication with users through technology and feedback at the user end after discussion.

After that, we conducted an inspiration analysis to define keywords for each example by looking for similar related case studies. In the next chapter, we will use the keywords summarised in this chapter to start designing the project content.

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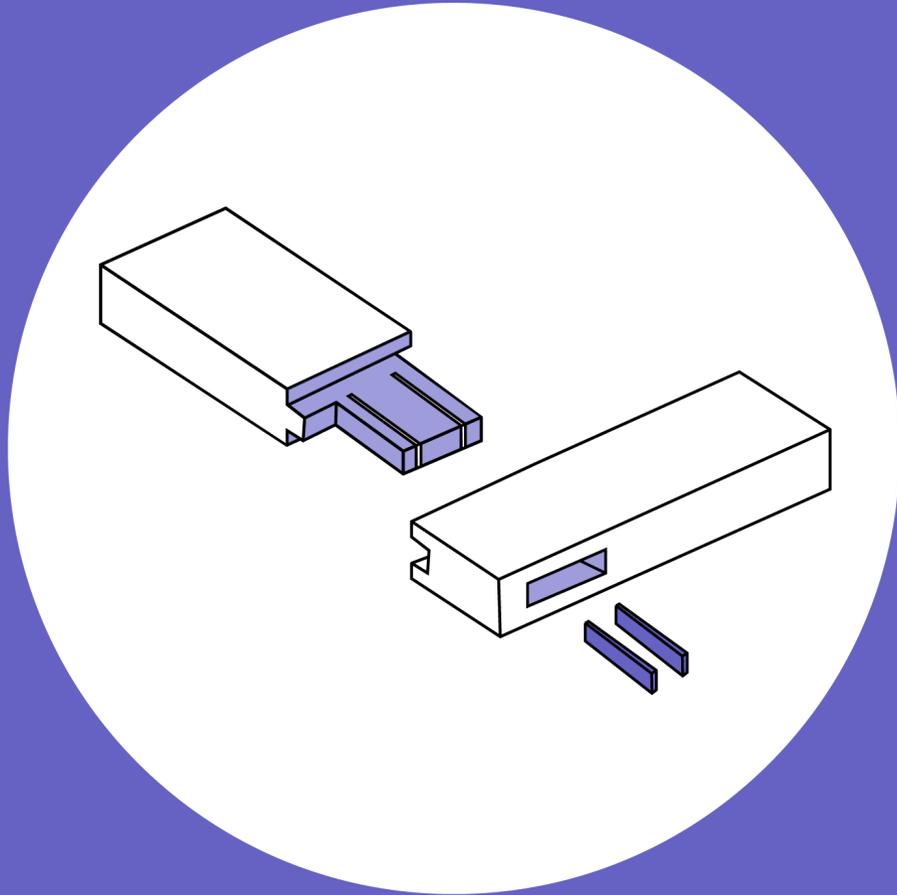
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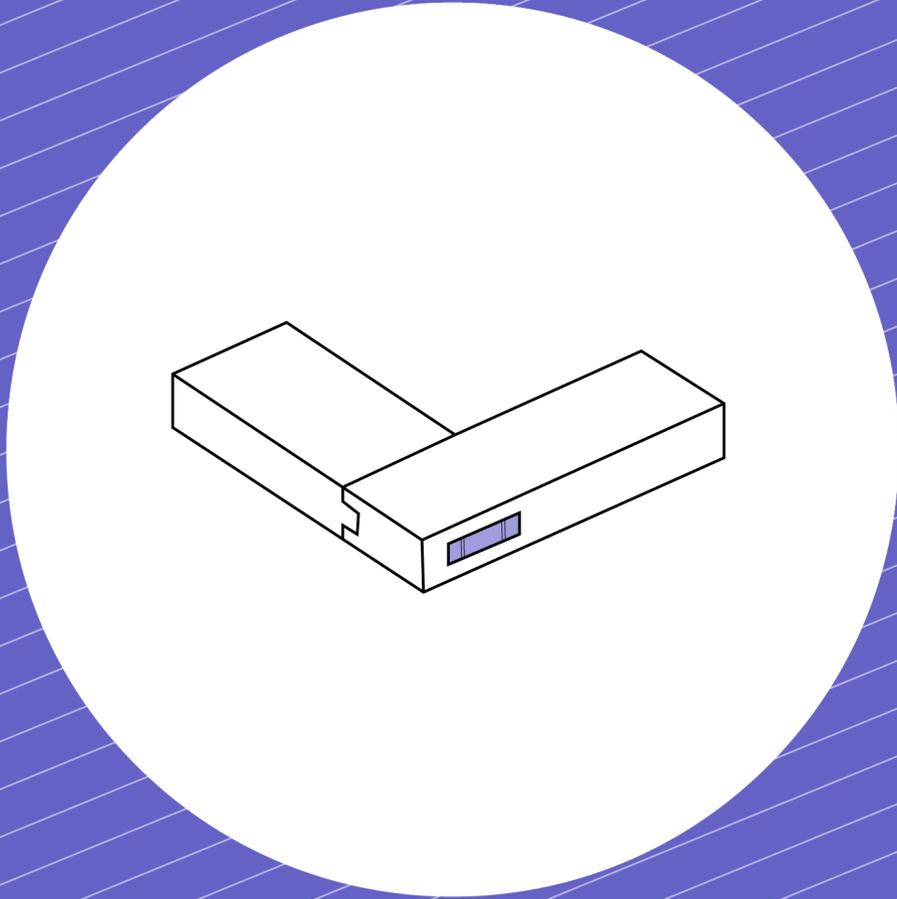
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PROJECT **7**

7.1 Discussion on the expression form of the main body of the project

Based on the conditions we have listed in the previous section, this chapter describes our planning direction for the project.

7.1.1 Ways to attract users

In the last chapter, we analysed various cases, most of which are for illustration, how interactive or interactive images can attract users' attention in a short period. And this is a turning point that is significant for our project. As we all know, Chinese culture is unfriendly to non-native Chinese speakers because the content is iterative and difficult to express and explain. This is mostly because many traditional Chinese crafts have their unique names, so how do we attract them in the first place? What is the user's attention? We made the following three points to attract the attention of the audience:

1) Attract users with dynamic screen status

Compared to the static form of screen content, or the motionless form of exhibits, dynamic exhibits are more attractive to users. Often, in the case of a screen interface of the same size, the user's attention will be in turn: motion, colour, and shape. More simply, this is what humans left in the process of evolution. It is an instinctive reaction that applies to all types of users. But at the same time, one part we need to pay attention to is that the user's attention is limited, and it is not attracted by the endless, so when the time is getting longer, the user's attention will begin to distract. So this leads to the second part of our control of the user.

2) Use the user to attract users

The second part of our setup is to use the image of the

user to attract users. We hope that we can understand our definition at the very beginning of the user's contact with our project. It is spreading the traditional Chinese handicraft culture. This requires a medium for users to understand, especially the group we face is Italian. How to make an Italian who is a "foreigner" to Chinese culture to recognise a new culture in his own country is an exciting topic. Here we use the portrait and motion capture camera to verify the user's movements and faces and display them on the screen. At the same time, the users displayed on the screen are already wearing traditional Chinese costumes. Of course, this is also with us. The way to iteratively update the project is related, which we will describe in detail at the next point.

3) Better iterative approach

As we mentioned in the previous iteration, it is another design point that we think will make the project attractive to users in our project. Since the object of the plan (or we say it is the object of communication) is Italian, the location of the exhibition may be regular or may be relatively fixed, so how to let the audience return to the display after a particular time. It can also be re-engaged. This is necessary, so we incorporate the iterative approach of the project into the main work of the design. But at the same time, this iterative approach needs to be closely related to China's traditional culture, so after our discussion and analysis, we came up with a solution: through the "wearing" of the user as the starting point for iteration, this is the traditional Chinese tradition. Culturally related, because different dynasties in China have different characteristics of clothing, usually a big difference, so we hope to use such dynasty features as the first step of iteration; then it is the iterative feature in the main interactive screen We will do more analysis in the second chapter of the interactive game.

7.2 Main screen interaction the main content and form expression

In the previous section, we are discussing how to attract users. After letting the user's senses and psychology accept the main appearance and form of the project, the most important thing is the subject interaction content of the project, which is also the core process of our project. Before describing and analyzing this section, we need to define the interactive screen first.

7.2.1 Equipment defining the project

7.2.1.1 Interactive screen

Interactive devices are an essential part of how users can understand and recognize in what way. So we used a larger interactive screen and area on the project's device. The size of the screen is: the overall screen: 3000mm * 1200mm,

the screen is divided into three parts: the main interactive screen area in the middle is: 700mm * 1200mm, the left and right sides are auxiliary response screen, the size is: 1150mm * 1200mm. The height of the screen is 1200mm.

In the case of determining the size of the screen, combined with the discussion of the user's attraction method in the previous part, we make the following divisions of the role of the screen: the main interactive screen: the middle area in the figure, which is responsible for completing the main interaction activities and the area where the primary information is displayed. In this area, only one user can be used at a time. If other users enter the recognition range, they will be automatically discarded. The more extended screens on the left and the right are auxiliary interactive screens. The primary function is that when the portrait and motion capture captures the feedback screen after the user, the images or animations of the user wearing ancient Chinese costumes will be displayed on the two screens. After that, the user in front of the main operation screen, an auxiliary response of the information is performed as an auxiliary screen.

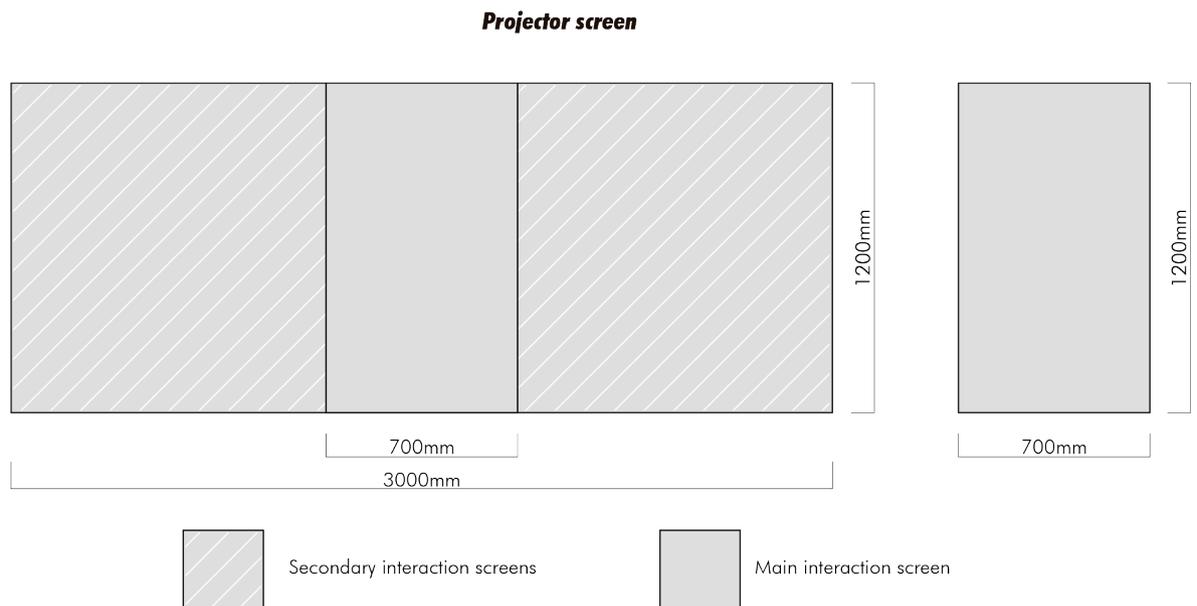


Figure 70. Project Screen

7.2.1.2 Interactive device table

In our project, there will be a table with a solid structure that will wrap around the sides of the user. When no user interacts with the gesture in the primary interaction area, the table will extinguish the light and keep it consistent with the surrounding environment. Only the corners of the table will have weak light to prevent the user from accidentally colliding.

And the mortise and tenon structure placed on the desktop will be messed up, and the user will see a single piece of the device, rather than the state that has been stitched. On the corresponding desktop of each component, there will be a circle of the outline light of the element, which is used as a splicing interaction to remind the user to complete the actual desktop when the interface is completed. At the same time, we will connect the pieces to the table, utilising magnets. At the same time, since we need to confirm

whether the user matches correctly, we also need to place electronic components in the component to validate the correctness of the user's match. Here we will conduct a simple technical analysis to determine what to put in the element. Kind of electronic components.

7.2.1.3 Selection of electronic components within the part

Since our project only needs to use short-distance signal transmission and two to three items to form a pair of matching groups, we decided to use Near Field Communication (NFC) NFC enables two-way communications between electronic devices after our initial screening. (AL-OFEISHAT & RABABAH, 2012), this is in full compliance with our definition of the physical product of the project. And nfc's price is lower, the transfer speed is faster, so we will build NFC in the mortise and tenon structure of the project to achieve the judgment of whether the user

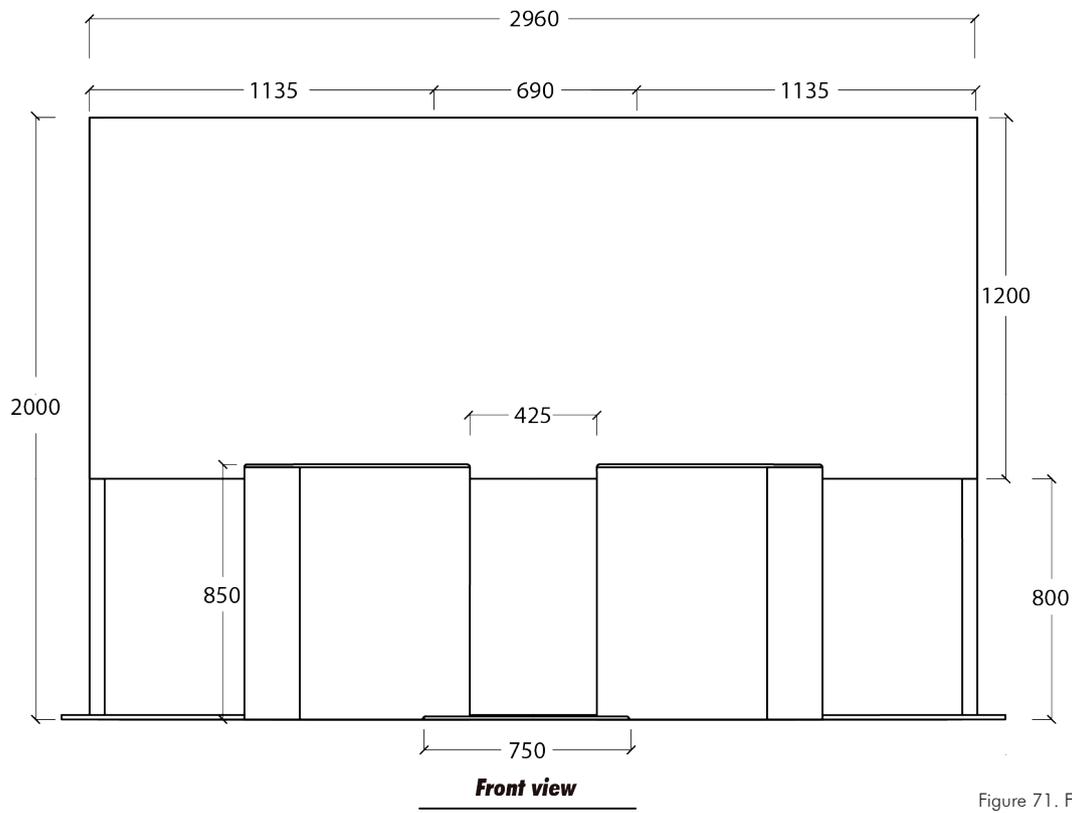


Figure 71. Front view

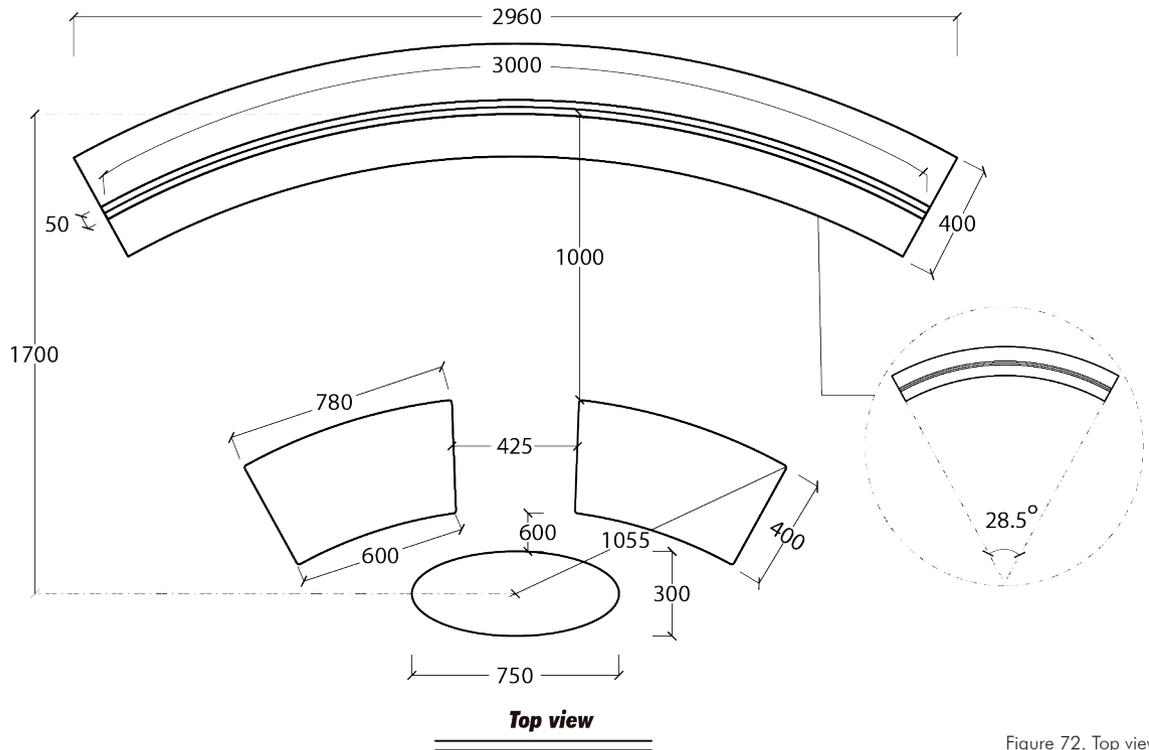


Figure 72. Top view

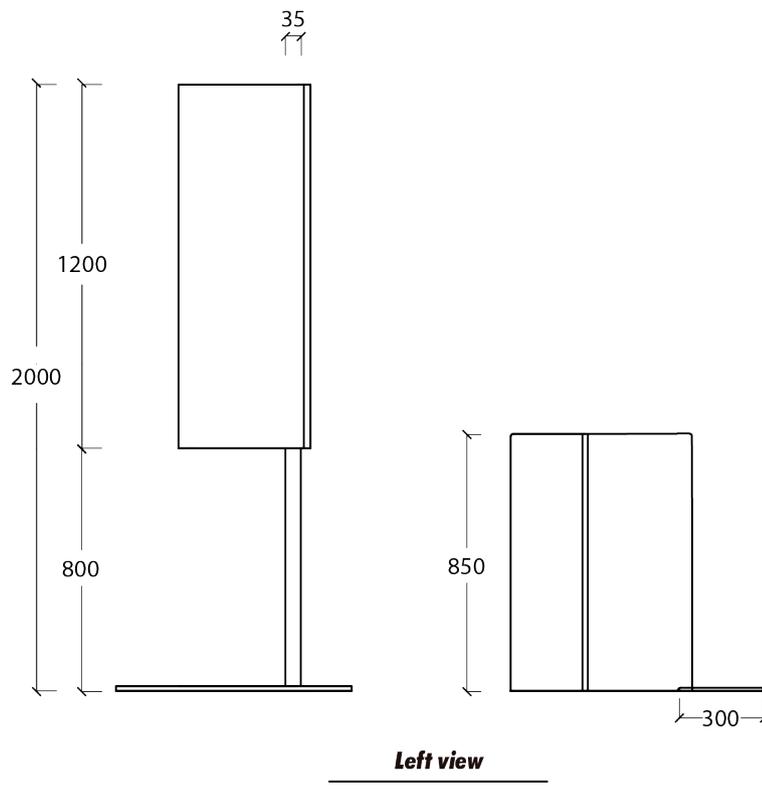


Figure 73. Left view

matches the mortise and tenon structure accurately.

7.2.2 Entity's item interaction process

In our analysis and research, we conducted a series of reasoning and analysis on whether we need a physical item experience process. Finally, we decided to add a physical item interaction process to the project. This is a structure that allows the user to actually feel the entity after the content of the screen interaction. It is just a design that has a farther impact on the user, allowing the user to not only perceive and understand the use of the screen on the screen. The scene and the way of use, as well as the actual mortise & tenon structure, can be held in the hands for sensory influence. How to place these parts and how to interact in this part will be explained in detail in the storyboard of 7.2.4.

7.2.3 Interactive content of the main interaction screen

The leading interactive screen is the essential screen display area in our project. In this area, we mainly use gesture interaction to let users interact with the project. This effectively allows the user to see the complete screen, but it is not laborious. Of course, we know that only by

understanding the process of creating interactive products and services can we begin to understand the meaning of the participation that users or audiences experience. The core of this understanding is the strong relationship between research and practice based on the contributions of mutual respect to interaction design. (Smyth, 2010, pp. 1–3) .

7.2.4 Storyboard

7.2.4.1 Main scene

The main scene We placed the entire interactive project in an exhibition room. We can see that the main screen will be displayed as a curved screen. The scene also includes motion capture, portrait capture, projector equipment, display table and user. Interactive area.

- a. The motion capture device is set to capture user behaviour and user gestures, and is placed above the main interaction area to facilitate capturing the operator's action behaviour;
- b. Portrait trap, to capture information such as the face of the user entering the exhibition hall, the captured image will be fed back on the auxiliary screen;
- c. The projector is used in conjunction with our screen to display all the pictures;
- d. The display table is placed on the mortise and tenon components, to allow the user to interact with the physical

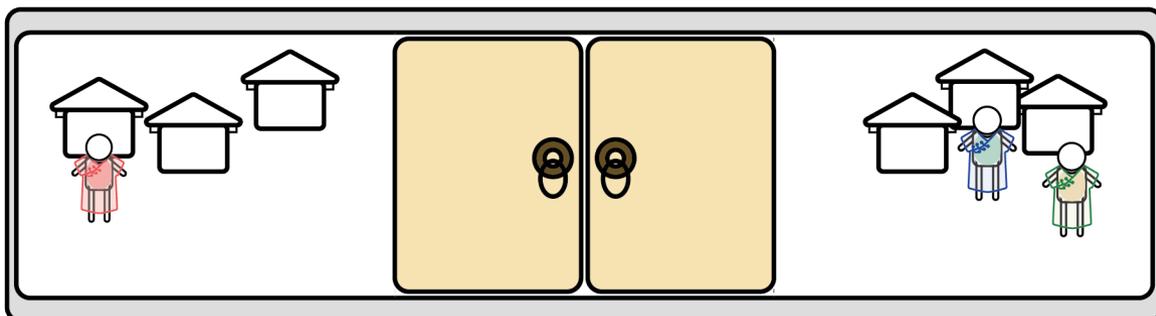


Figure 74-A. Storyboard

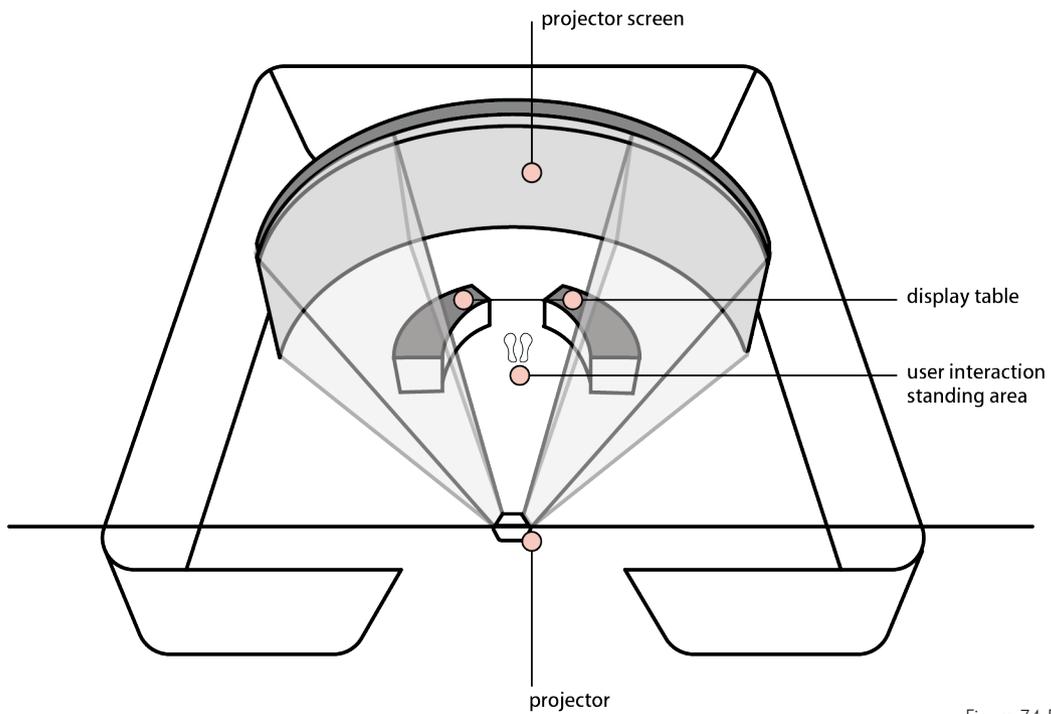
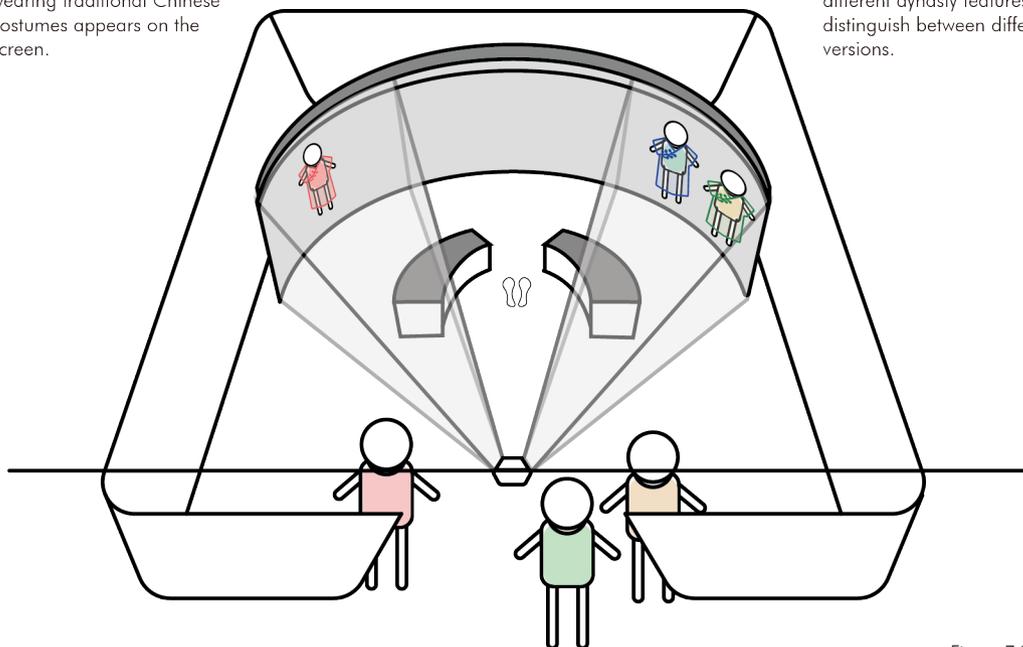


Figure 74-B. Storyboard

When the user enters the room, the image of the user wearing traditional Chinese costumes appears on the screen.



This is also the iteration of the application. We expect to use different dynasty features to distinguish between different versions.

Figure 74-C. Storyboard

objects after completing the screen interaction;

e. The user interaction area is 1500mm from the screen, which is suitable for the user to see the main interactive screen. The main operating range of the user will be completed in this area.

7.2.4.2 Main screen display content

The main screen is the main interaction place of the user. After entering the exhibition hall, the user's screen on the main screen is a door graphic of a Chinese classical courtyard before the operation. This is a beginning, an immersive way we create, and we hope to start from this point and let the user understand that they have started exploring mortise and tenon.

a. The beginning of the project is that the user will open a door, the door will appear on the main interactive screen (middle area), and the two adjacent screens on the side are also the scenes in the extended courtyard. The user will follow the on-screen prompts to start the first action interaction and push the door open.

b. The screen will prompt the user to enter the room. The steps to enter the room are attractive because we want the user to believe what they see fully, so the way we begin here is to simulate when people go into an ancient Chinese family. The idea - you need to cross a threshold, then the screen will prompt the user to lift their feet and make a step to "enter" the interior of the room.

c. When the motion detector detects that the user has entered, it will start the first booting of the screen NPC. At this time, the prompt of the screen is: "You have entered the interior of the living room of the Qing Dynasty¹ in China, where you see everything. The furniture is handmade, and the furniture is not fixed with glue and metal nails. Below you can explore their structure."

When the prompt disappears, the furniture on the screen will flash a hover state that can be selected. At this time, the interaction is to allow the user to choose any furniture to explore and does not limit the user's choice is a standard of ours. We want to be inclusive of all the actions of the user

¹ The dynasty here will be updated according to our iteration, which is not fixed, and all prompts will be changed according to this rule.

to the extent allowed.

d. After the user has selected the furniture that he wants to explore further, the main screen will open a new screen with the auxiliary screen. The main screen will display the explosion map based on the furniture structure and the mortise and tenon that can continue to explore. The part information, while being displayed on the auxiliary interactive screen, will be more detailed information, including the specific material, specific name and part information of the furniture.

e. After the user has browsed the information on the screen, the NPC of the system will make a second popup. The prompt on the screen will be: "This is an item of furniture with special mortise and tenon, you can choose a part that you would like to explore more."

f. After the user makes a free choice, the main content of the leading interactive screen will change from furniture to the part selected by the user, and a simple animation demonstration will be started to let the user know the assembly method and parts of the role she or he chooses. The specific shape; then the user will need to use a gesture operation for a simple rotation to complete the perfect stitching of the two components. At this time, the auxiliary screen will perform more demonstrations of the same type of mortise and tenon².

e. After the user completes the above actions, the NPC of the system will appear for the third time. The prompt is: "Next, you will accept the new challenge, and the light will be lit on the table at your hand." When the user picks up the specified part on the table according to the prompt on the screen, a new prompt message will appear on the screen. "Please follow the knowledge you just learned and match it correctly to another part to fix this beautiful furniture. "At this time, the user needs to find the mortise or tenon paired with his hand on the display table to complete the splicing of the model. If the user splicing correctly, the repaired furniture image will be displayed on the screen, and if the user does not complete the stitching or the wrong stitching, and the furniture on the screen will display the damaged image.

² Some of the mortise and tenon have the same name, but the actual parts have subtle differences. For example, there are different numbers of saw teeth or different angles in the dovetail, but they are collectively referred to as dovetails.

The purpose of this part of the interaction is to allow the user to continue to be influenced by this traditional craft after completing the screen interaction, to get better cognitive effects and positive and positive feedback to the project. Through this step, it is also specific guidance for the iterative update after us, whether to improve the difficulty or

reduce the problem.

Besides, this part of the auxiliary interactive screen will be similar to the primary screen information, to spread the news more widely.

7.3 Gesture interaction rules

7.3.1 Why does the project use gestures?

The reasons why the project uses gestures are summarised in the following three reasons:

1) To match the larger screen size

The size of our project screens is vast, unlike the displays of regular exhibitions, which is a broader screen. Therefore, this requires that the user's position is relatively far from the screen, and the farther distance can ensure that the user can better see the information displayed on the screen. Therefore, using gestures is a more acceptable behaviour when the user is away from the screen. This does not require the user to compare the ratio of the information on the keyboard to the screen information through multiple head-up and bow-down actions, which is the most convenient method.

2) To reduce learning costs

When interacting in such a magnificent place, the first thing we consider is the cost of learning. What we hope is that the user can complete a series of actions without additional education, and the gesture interaction is like this. The characteristic is that it is a kind of operation that can fully meet the human instinctive reaction, and does not need corresponding letters or pronunciation.

3) To cooperate with the fault tolerance mechanism

When the user first comes into contact with the project, the fault tolerance mechanism needs to be considered regardless of whether the user understands the craft. This is an indispensable part of an interactive device, and the people facing the project are Italians. They are non-native Chinese speakers and cannot complete a deep understanding in a short period, but the project content or the project subject. The meaning of the expression needs to be understood step by step, so we hope to give users more opportunities for fault tolerance.

7.3.2 Gesture interactive content regulations

1) Corfom

“Corfom” is the gesture action that will be used by the user at most in this project. There are two common ways to determine in everyday life. One: Double click in the keyboard and mouse input; Second: Touch in the data (usually click). So we combine the above two common ways.

We hope that users will have more "firm" and "completely" feelings when using "OK", so we use the gesture of "kick a fist, fast knock twice" as the determination. Gesture.

2) Select (hover)

The "choice" process, or hovering state, is a gesture that exists throughout the project from start to finish. This is a familiar gesture, whether it is the way we used it in the movie we analysed in Chapter 3, or the movements of the MacBook's touchpad in our daily lives are controlled by sliding with our fingers.

3) Other gestures

Zooming in and out: Zooming in and out is also a gesture that can be quickly responded to by the user. It is just a way we often use, such as the way of pinching on a PC or a mobile phone, so we will use both hands to open and close

the side. The two actions represent the method and reduced action.

Open the explosion map: When the user needs to open the explosion map (when viewing the internal structure of the furniture), we will use one-handed opening to represent: open the explosion map; the way the fingers are closed means: close the explosion map and return to the original state of the furniture.

Back to the previous level: The gesture of returning to the last layer is rare in our project, not the main course of the story. We hope that the user rarely uses this gesture when executing commands. But since the return is an indispensable step, we use a method like Shake the phone to delete information in the IOS system. When the user swings his hand, he asks if he needs to go back to the previous layer.

7.4 High fidelity prototype

7.4.1 Standards for high fidelity prototyping

According to the analysis and summary of the previous three parts, there are three high-fidelity goals for our most important purposes:

1. Can be used and complete the usability test of the project.
2. It can be used when the project is finally displayed.
3. As a standard and basis for the subsequent production of real products.

7.4.2 High fidelity prototype before usability test

Below we will produce high fidelity in the logical order of the project and explain.

7.4.2.1 Start

This is the initial picture that the user sees. We default to the beginning of the image (the beginning of the activity) is that no user enters the picture, so the effect presented on the movie is that there is no mapping of the user image.

The shape of the house we selected is the ancient building of Huizhou. This is also because the NPC (Non-Player Character) in the project we set up is a character with a specific identity. We set it as an Italian who preached in China.

The real figure in the history of Matteo Ricci is a Catholic Jesuit missionary and scholar in Italy. During the Wanli Period of the Ming Dynasty, he came to China to preach. It was recorded in the history of the Ming Dynasty in China. "The Inscription on the Inscription," said: "万历庚辰有泰西儒士利玛竇，号西泰，友辈数人，航海九万里，观光中

国。" The mean is: during the Wanli period of the dynasty, there was a man named Matteo Ricci, who and his friends travelled to China for a long journey. Matteo Ricci was the first Western scholar to read Chinese literature and delve into Chinese classics. He has made many officials and celebrities in China and has spread a lot of Western cultural knowledge. He wrote "The Matteo Ricci China Notes", which recorded what he saw and heard in China during that period. Matteo Ricci is like the cultural communication link between original China (and even East Asia) and Italy (Europe). Made an essential contribution to the exchanges between China and the West.

As an NPC, he is an Italian who can make the audience we serve intimate, and is a real historical figure who is very important in the cultural exchange between China and the West. It is worth knowing.



Figure 75. High fidelity prototype-Start

7.4.2.2 Prompt the user to open the door

After the user is directed to the central operating area, the motion capturer will capture the presence of the user and feedback on the screen a gesture action that requires the user to push the door. When the user raises his hand, the motion capturer will capture the user's motion and display a blue dot on the side that directs the gesture on the screen,

feedback to the user, the gesture has been captured, and the next action can be taken.

After that, the user will be able to follow the on-screen prompts to open the door and enter the courtyard interior.



Figure 76-A. High fidelity prototype-Prompt the user to open the door



Figure 76-B. High fidelity prototype-Prompt the user to open the door

7.4.2.3 Enter the background part of the story in the courtyard

When the user pushes the door open and enters the yard, the NPC will appear for the first time. He will introduce himself briefly and enter the environment inside the screen

to make a brief introduction and guide the user into the scene.



Figure 77-A. High fidelity prototype- Enter the background part of the story in the courtyard



Figure 77-B. High fidelity prototype-Enter the background part of the story in the courtyard



Figure 77-C. High fidelity prototype-Enter the background part of the story in the courtyard

7.4.2.4 Enter the interior of the room

After the user walks through the courtyard, the exploration of Ming Dynasty furniture will officially begin. The NPC will guide the user through the gesture interaction in a simple way to select the furniture. When the user starts to choose, the auxiliary screens on the left and right sides will display an image of the free viewing angle of the furniture selected

by the user. However, we will set the screen on the left and right sides to have a small amount of time delay effect, to ensure that the operator does not interfere with the main interactive screen in the middle, but also for other viewers to remain curious about the interactive display in the middle.



Figure 78-A. High fidelity prototype- Enter the interior of the room



Figure 78-B. High fidelity prototype-Enter the interior of the room

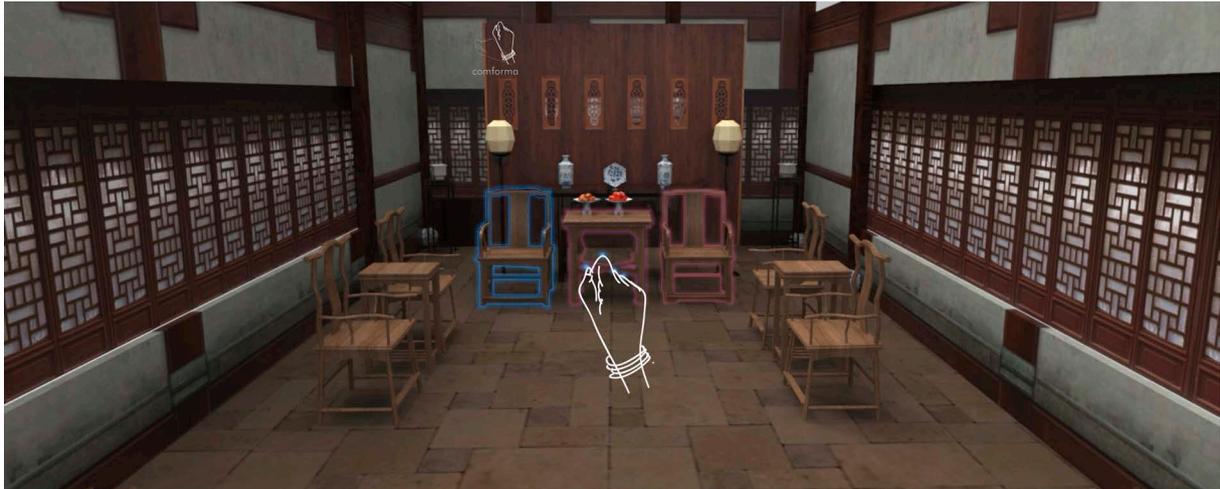


Figure 78-C. High fidelity prototype-Enter the interior of the room

7.4.2.5 Exploring the structure

When the user views the furniture, a reminder of the new gesture will appear on the screen, prompting the user to open the explosion map by opening the finger. At this time, the NPC will briefly introduce the Chinese furniture, and the characteristics of the skeleton will be the first time is passed to the participating users, which will quickly help the user enter the game.

Next is the part that the user is free to explore. The selected furniture on the screen will flash the optional red part to the user. These optional parts will represent the structure that can be explored. Users can freely choose and explore.

When the user selects one of the components, the NPC will continue to guide the user to perform on-screen learning. This learning is simple and fast, and the user only needs to rotate and splicing in accordance with the prompts on the screen to complete a series of actions.

In this step, the auxiliary screens on the left and right sides will be supplemented with information, including a furniture materials, age, features and dimensions during the overall furniture display. b- the name of the structure, the number of parts when a single component is displayed.

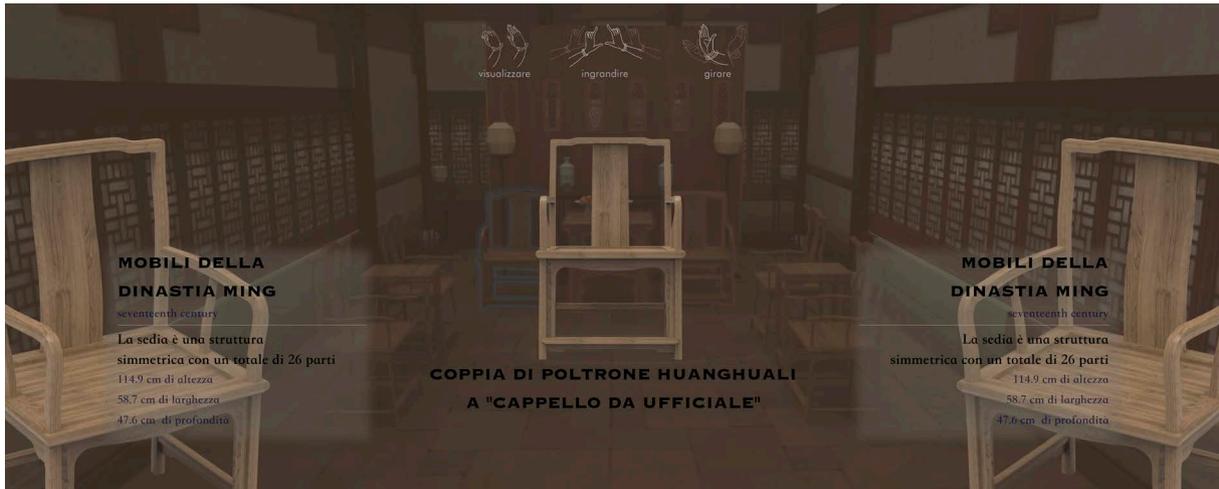


Figure 79-A. High fidelity prototype- Exploring the structure



Figure 79-B. High fidelity prototype-Exploring the structure



Figure 79-C. High fidelity prototype-Exploring the structure



Figure 79-D. High fidelity prototype-Exploring the structure



Figure 79-E. High fidelity prototype-Exploring the structure

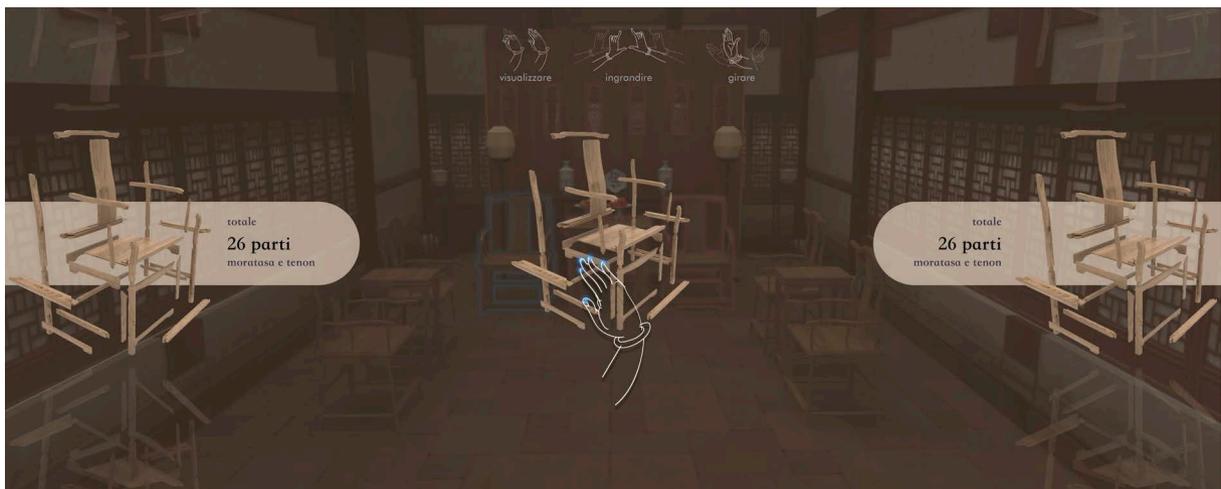


Figure 79-F. High fidelity prototype-Exploring the structure



Figure 79-G. High fidelity prototype-Exploring the structure



Figure 79-H. High fidelity prototype-Exploring the structure

7.4.2.6 Perform structural exploration and structural analysis on the screen

This part is essential. When the user finishes selecting a single structural part of interest, the content on the interface will be converted to wireframe for a single structure and a project that can be freely rotated and opened. Users can view details such as details without restrictions. At this point, the auxiliary screens on the left and right sides will display

the wireframe model of the selected mortise and tenon structure to show the actual internals of the mortise and tenon structure. Since only the middle screen is operated by the user, some information will be provided to other users, and this information is an active information display without requiring other users' operations.



Figure 80-A. High fidelity prototype- Perform structural exploration and structural analysis on the screen



Figure 80-B. High fidelity prototype-Perform structural exploration and structural analysis on the screen



Figure 80-C. High fidelity prototype-Perform structural exploration and structural analysis on the screen



Figure 80-D. High fidelity prototype-Perform structural exploration and structural analysis on the screen



Figure 80-E. High fidelity prototype-Perform structural exploration and structural analysis on the screen

7.4.2.7 Interaction of physical items and feedback from the screen

After the user completes the virtual operation on the screen, NPC will prompt to start the matching exploration of the physical product. This is of considerable significance to our project, because when we inspire the user to explore the desktop, the user will be able to touch the actual mortise and tenon structure by hand and observe the mortise and tenon structure through the touch. Of course, here we set the more laborious steps relative to the screen learning process. The user will find the first one through the light on the desktop, and then the user needs to see the actual view that can be lit with the light on the left and right sides of the table based on a series of explorations and cognitions the part that matches the condition.

Feedback on whether the user operates correctly. We have made some design on high fidelity. When the user starts to explore the physical structure, the explosion map effect diagram corresponding to the structure to be assembled will appear on the screen. If the user is correctly stitched, then the monitor is on the screen. The "open" part will close, and the system will prompt for the correct sound. If the user splicing incorrectly, the "open" section of the screen will fall to the ground and give the wrong music. At the same time, in the region where these two possibilities appear, NPC will look for more detailed explanation and guidance.



Figure 81-A. High fidelity prototype- Interaction of physical items and feedback from the screen



Figure 81-B. High fidelity prototype-Interaction of physical items and feedback from the screen



Figure 81-C. High fidelity prototype-Interaction of physical items and feedback from the screen



Figure 81-D. High fidelity prototype- Interaction of physical items and feedback from the screen



Figure 81-E. High fidelity prototype-Interaction of physical items and feedback from the screen



Figure 81-F. High fidelity prototype-Interaction of physical items and feedback from the screen

7.4.2.8 End and thank

After the user completes the desktop exploration and succeeds, the NPC will appear, prompting the user that all the exploration processes have been completed, and the

direction of the interface interaction has ended. Thank you. A message appears on the screen and will automatically exit the room, close the door and return to the first interface.

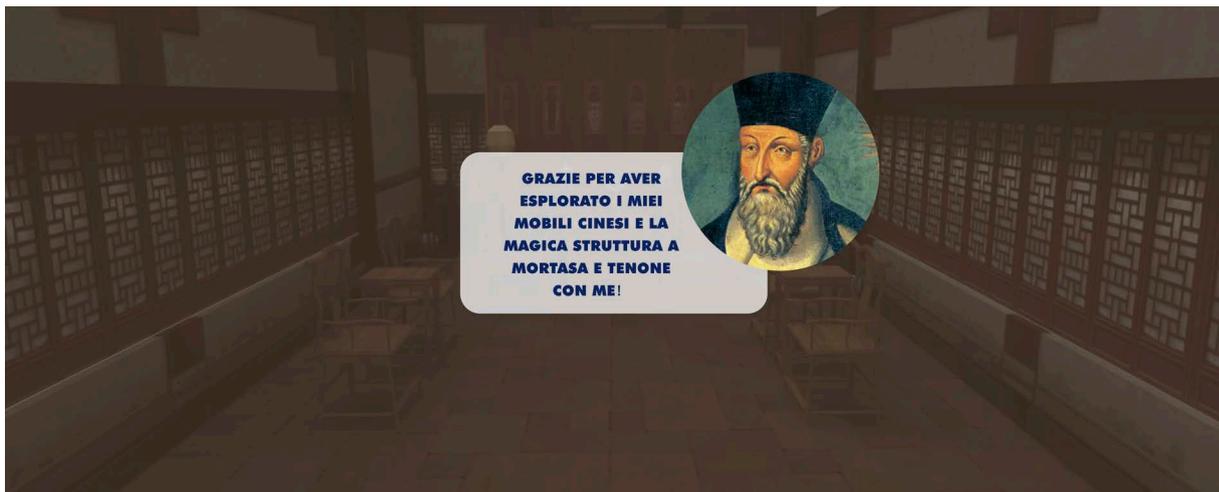


Figure 82-A. High fidelity prototype- End and thank



Figure 82-B. High fidelity prototype- End and thank

7.5 Usability test

7.5.1 About usability test

For our projects, usability testing is our first step to ensure that the projects we export are acceptable and usable by Italians, and we hope that users will have a better user experience when using our projects, and can There is also the possibility of re-engagement after the end of the project process.

In this usability test, we used the high fidelity prototype shown in the previous chapter and used the usability test of the hot zone click jump in the sketch.

7.5.2 Pre-test thinking

For our project, we are very clear about the content of the test, divided into the following parts:

- 1-Do users have a desire to understand such a culture? Are you willing to understand Chinese culture?
- 2- Is the size of the facility in the exhibition hall reasonable? Can the user use it usually?
- 3- Gesture is complicated? Can users remember these

gestures?

4-Do users understand the process of this game? Did the users know?

5-Is the process of play reasonable? Does the user have the patience to complete all the steps?

7.5.3 Test method

The way the test is used is the clickable jump connection directly exported by the sketch. The user will directly use the touch version of the computer to replace the gesture operation in the real scene.

The test method will be to use: vocal thinking and retrospective testing.

7.5.4 User recruitment

Most of the users we recruited were university students, some faculty members, and some ordinary citizens of Turin. User male to female ratio 1:1.

(Table 30. User information)

	Age	Gender	Career	Education level	Acceptance of technology	Awareness of Chinese culture	Frequency of visits to the exhibition
User A	18	male	student	undergraduate	very fond of	ordinary	very often
User B	25	male	student	postgraduate	very fond of	very concerned	often
User C	22	female	worker	undergraduate	general	not too concerned	usually
User D	32	female	staff	undergraduate	general	not too concerned	seldom
User E	28	male	student	Ph. D.	very fond of	ordinary	very often
User F	29	male	chef	high school diploma	not too concerned	not too concerned	seldom
User G	19	female	student	undergraduate	very fond of	learn some	very often
User H	38	female	teacher	Ph. D.	general	learn some	usually
User I	42	male	driver	high school diploma	general	not too concerned	seldom
User J	25	female	student	postgraduate	very fond of	learn some	usually

Table 31. User information

7.5.5 Usability test results

	Question name	User opinion	summary of the issue
user A	Is the door open automatically? How do I know that I pushed the door open?	I hope that at the beginning of the event, let me know how the door is opened.	Gesture operation feedback is not clear.
user B	Do I have to and can only stand in this prescribed position? Can I only stand in the middle of the screen?	I hope that my activity area will be increased.	The user location specified by the interactive device is too small and too fixed.
user C	Can I take the model of mortise and tenon away?	I hope that gifts or souvenirs can be taken away.	The lack of souvenirs allows users to take away.
user D	Do I have to put the model of mortise and tenon back in place? I am worried that I can't remember where the model was originally placed.	I hope there are markers on the table to remind me of what model is corresponding to each location.	The user is unable to get information to help him put the model of mortise and tenon back in place.
user E	I am not very tall, can I easily get all the models on the table?	Consider more for girls who are small. Improve the size of the table.	The desktop is too high or too large to fit on every user.

Description and analysis of the problem	Program improvement	Program evaluation	Improvement result
Since there is no gesture operation feedback, the user cannot get feedback when starting the action, so the user does not know how to open the door.	Increase gesture feedback.	Mandatory	Increase gesture feedback and add animation effects to gesture feedback on the screen.
Because of the size of the screen and the limitations of the gesture catcher, the user cannot move while interacting. The user has no other active locations.	Unable to improve	Ignored	Unable to improve
There is a need to control project costs and it is not possible to design a model that can be taken away.	Increase the sense of adsorption of the model and the table, let the user know that the model can not be taken away.	Important	Increase the sensation of sputum and table.
There are no markers and symbols on the table to help the user put back the model.	Mark the symbol or item shape on the desktop to help the user put the model back in place.	Mandatory	A backlight that makes a shape corresponding to the model on the desktop.
The farthest distance on the table is too far away from the user. The body can't easily get the farthest squat model on the table relative to the not-tall user.	Improve the size or height of the table. Make it easy for users to get all the models.	Mandatory	Improve the size or height of the table. Make it easy for users to get all the models.

Table 32. User test results-1

	Question name	User opinion	summary of the issue
user F	How do I know that my fight is correct? How do I know if my test is successful?	The animation effect when looking for the right model and succeeding becomes more apparent.	When matching and smashing, the feedback of successful results is not clear.
user G	I think the Italian grammar on the screen is not quite right, which makes me feel a bit strange.	Improve the Italian grammar and modal particles on the screen.	The content of the NPC conversation is not appropriate.
user H	Can my child use this device and experience this game?	Let the children experience this event as well.	Only adults and older children can experience and participate in this game.
user I	Can I quit at any time if I don't want to continue playing?	There are options to exit and end directly.	Users cannot quickly exit the game during the interaction.
user J	My boyfriend is German and his Italian is not good. Can I choose an interface for other languages in this game?	Add interactive interfaces for other languages.	Only the Italian interface, so only people who speak Italian can participate in this game.

Description and analysis of the problem	Program improvement	Program evaluation	Improvement result
The screen feedback animation is not obvious when the user is looking for the correct and assembled correctly.	Increase feedback on the interface that tested successfully.	Mandatory	Increase the music effect and increase feedback when the user assembles successfully.
There are grammatical problems or problems with the use of words in the NPC conversation.	Improve the way Italian is expressed.	Mandatory	Improve the Italian language that appears on the screen with a native speaker.
Because of the limitations of interactive devices and gameplay, children who are too young can't experience this interactive gear and participate in the game.	Can be improved in iterative products.	Optional	Operational friendliness for younger children can be improved in iterative products.
Users cannot quickly exit the game during the interaction.	Add the option to quickly exit the game in the interactive interface.	Optional	Add the option to quickly exit the game in the interactive interface.
Lack of interactive interfaces in other languages.	Add interfaces to other languages.	Important	Add interactive interfaces for other languages in the iterative product.

Table 33. User test results-2

7.6 High fidelity prototype after usability test

7.6.1 Start



Figure 83. High fidelity prototype- Start

7.6.2 Prompt the user to open the door



Figure 84-A. High fidelity prototype- Prompt the user to open the door



Figure 84-B. High fidelity prototype- Prompt the user to open the door



Figure 84-C. High fidelity prototype- Prompt the user to open the door

7.6.3 Enter the background part of the story in the courtyard



Figure 85-A. High fidelity prototype- Enter the background part of the story in the courtyard



Figure 85-B. High fidelity prototype- Enter the background part of the story in the courtyard



Figure 85-C. High fidelity prototype- Enter the background part of the story in the courtyard



Figure 85-D. High fidelity prototype- Enter the background part of the story in the courtyard



Figure 85-E. High fidelity prototype- Enter the background part of the story in the courtyard



Figure 85-F. High fidelity prototype- Enter the background part of the story in the courtyard



Figure 85-G. High fidelity prototype- Enter the background part of the story in the courtyard

7.6.4 Enter the interior of the room



Figure 86-A. High fidelity prototype- Enter the interior of the room



Figure 86-B. High fidelity prototype- Enter the interior of the room

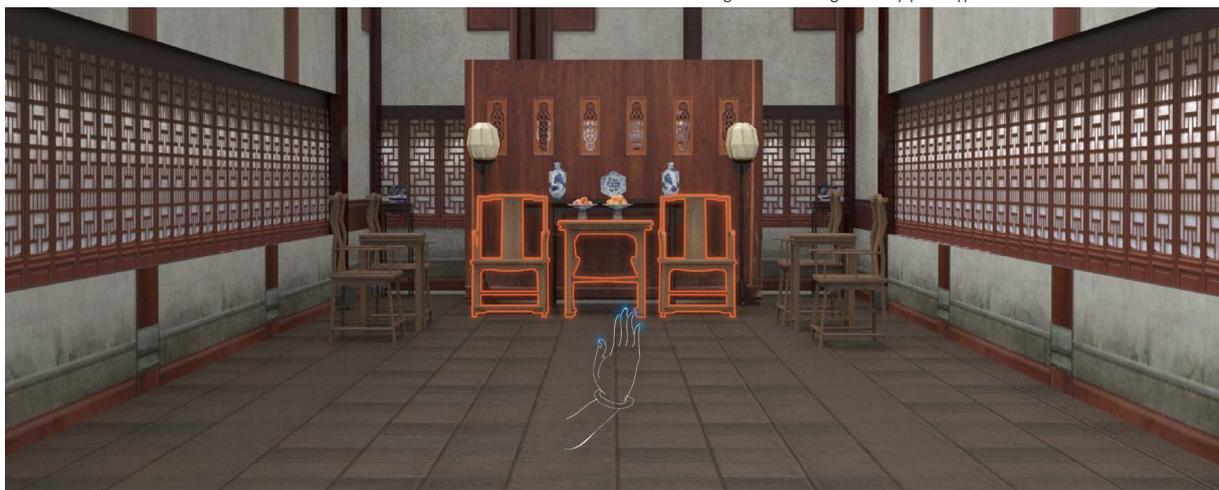


Figure 86-C. High fidelity prototype- Enter the interior of the room



Figure 86-D. High fidelity prototype- Enter the interior of the room



Figure 86-E. High fidelity prototype- Enter the interior of the room

7.6.5 Exploring the structure



Figure 87-A. High fidelity prototype- Exploring the structure



Figure 87-B. High fidelity prototype- Exploring the structure



Figure 87-C. High fidelity prototype- Exploring the structure



Figure 87-D. High fidelity prototype- Exploring the structure



Figure 87-E. High fidelity prototype- Exploring the structure



Figure 87-F. High fidelity prototype- Exploring the structure



Figure 87-G. High fidelity prototype- Exploring the structure



Figure 87-H. High fidelity prototype- Exploring the structure



Figure 87-I. High fidelity prototype- Exploring the structure



Figure 87-J. High fidelity prototype- Exploring the structure



Figure 87-K. High fidelity prototype- Exploring the structure



Figure 87-L. High fidelity prototype- Exploring the structure

7.6.6 Perform structural exploration and structural analysis on the screen



Figure 88-A. High fidelity prototype- Perform structural exploration and structural analysis on the screen



Figure 88-B. High fidelity prototype- Perform structural exploration and structural analysis on the screen



Figure 88-C. High fidelity prototype- Perform structural exploration and structural analysis on the screen



Figure 88-D. High fidelity prototype- Perform structural exploration and structural analysis on the screen



Figure 88-E. High fidelity prototype- Perform structural exploration and structural analysis on the screen

7.6.7 Interaction of physical items and feedback from the screen



Figure 89-A. High fidelity prototype- Interaction of physical items and feedback from the screen



Figure 89-B. High fidelity prototype- Interaction of physical items and feedback from the screen



Figure 89-C. High fidelity prototype- Interaction of physical items and feedback from the screen



Figure 89-D. High fidelity prototype- Interaction of physical items and feedback from the screen



Figure 89-E. High fidelity prototype- Interaction of physical items and feedback from the screen



Figure 89-F. High fidelity prototype- Interaction of physical items and feedback from the screen



Figure 89-G. High fidelity prototype- Interaction of physical items and feedback from the screen



Figure 89-H. High fidelity prototype- Interaction of physical items and feedback from the screen

7.6.8 End and thank



Figure 90-A. High fidelity prototype- End and thank



Figure 90-B. High fidelity prototype- End and thank



Figure 90-C. High fidelity prototype- End and thank



Figure 90-D. High fidelity prototype- End and thank

7.6.9 Other improvements after user test

7.6.9.1 Dimension

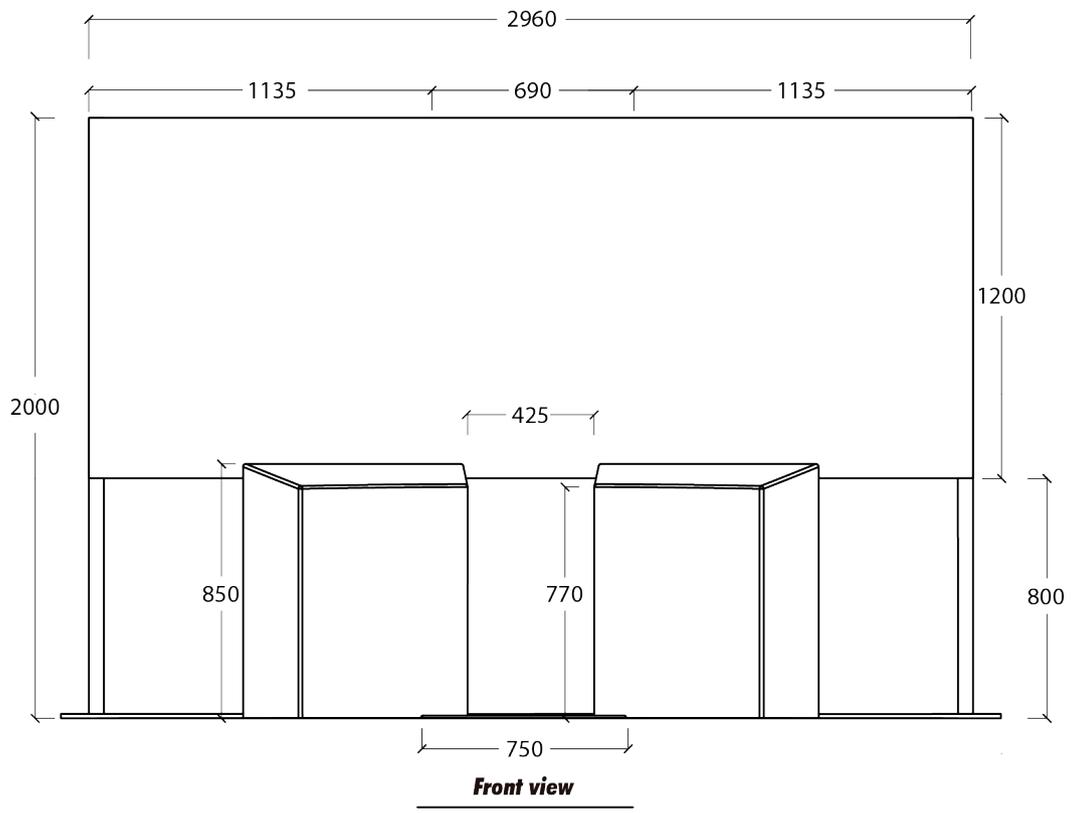


Figure 91. Front view

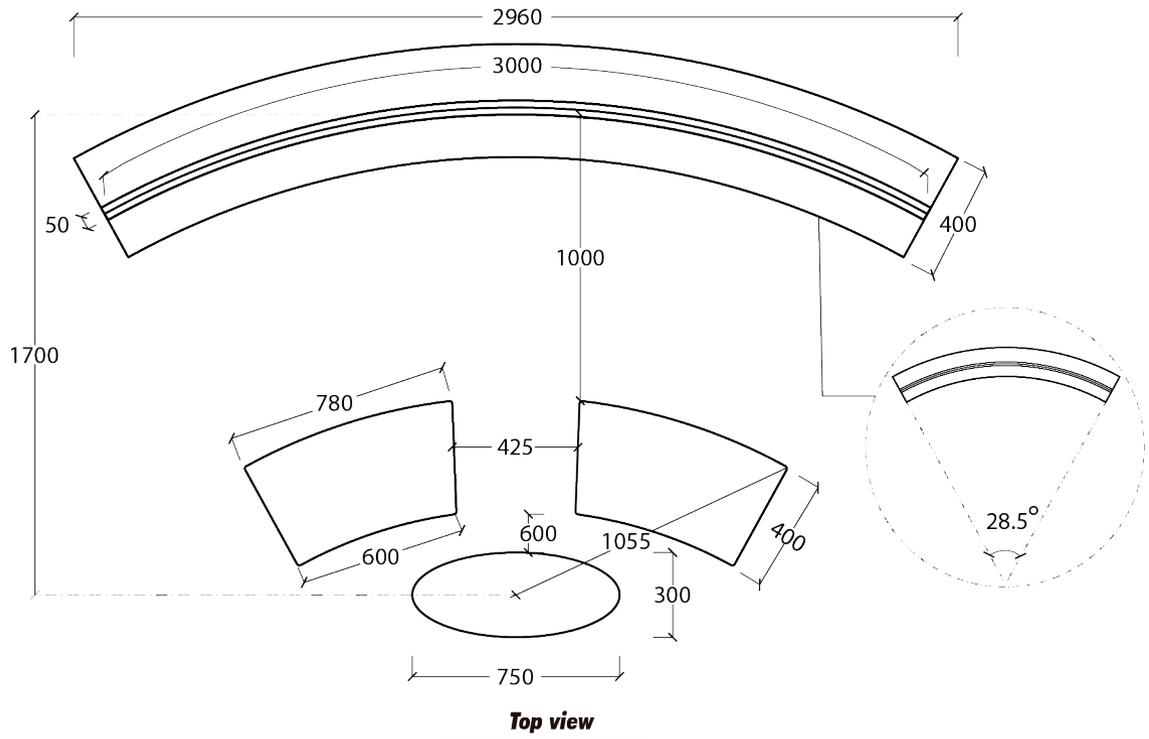


Figure 92. Top view

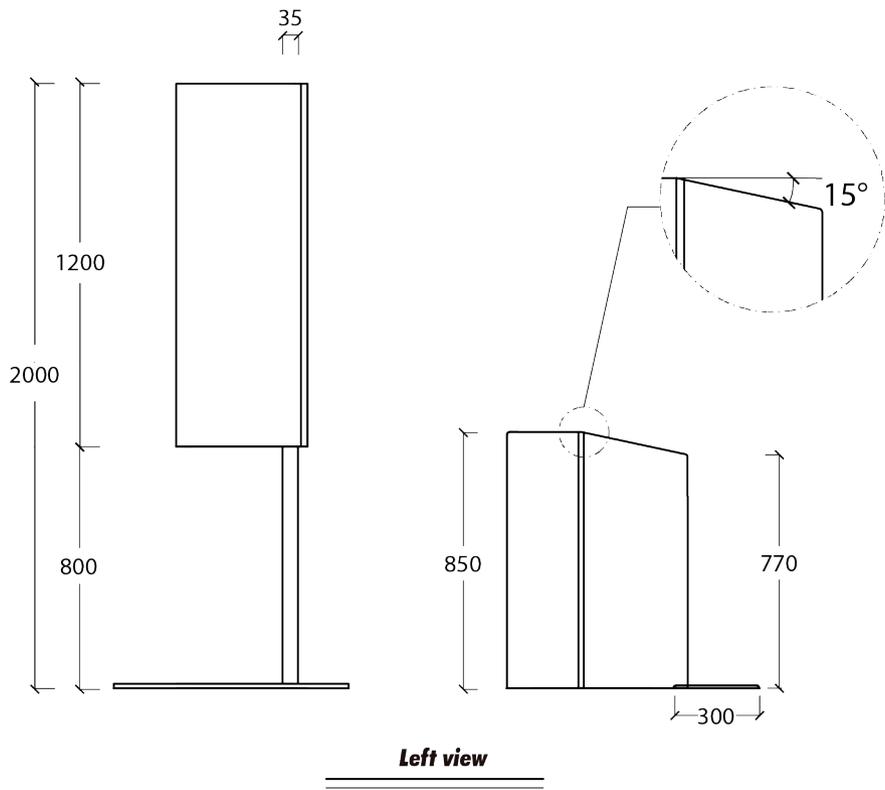


Figure 93. Left view

7.6.9.2 Rendering scheme



Figure 94. Rendering scheme

7.6.9.3 Iteration proposal



Tang dynasty



Figure 95-A. Iteration proposal



Song dynasty



Figure 95-B. Iteration proposal



Qing dynasty



Figure 95-C. Iteration proposal

7.7 Conclusion

In this chapter, we start from the main structure of the project, and gradually analyse the interactive means of the project, interactive devices and interactive processes. After the high fidelity was made, the usability test was carried out. Five mandatory problem points that need to be changed were summarized from the usability test, and the

problems were promptly revised and updated according to the questions raised by the users. In the end, we finally presented the project results, a device that spreads the traditional Chinese craftsmanship through the interaction of interface interaction and physical product interaction.

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Conclusion

In the past five years, people's demand for cultural differences has become more and more frequent. Tourists and scholars who travel to various countries for tourism and academic exchanges are also increasing year by year, and cultural inclusiveness is also growing. The process of world integration is often mentioned. People's understanding of the culture of other countries or regions has become more and more comprehensive. Compared with the more extended period, people no longer need to communicate by word of mouth or the physical carrier such as books and paintings. Instead, you can quickly get any information you want to know easily via TV, internet, mobile phone or other channels.

In such a large environment, we have bred our idea of wanting to spread traditional Chinese craftsmanship in Italy, because songs, dramas or other cultures can be covered more quickly than different conventional religions, and can be performed in theatres or It is the way of uploading videos on the Internet, etc.. Still, the lack of traditional Chinese handicrafts is challenging to be widely spread. As we analysed in the first chapter, the art of being used is a

long time, and the types of articles that can be produced There are so many, even in China, there is no suitable communication mechanism to publicise such a skill. Then in Italy thousands of kilometres away, how can this memory of the ancient people's knowledge be better disseminated?

During the production of our project for about five months, we collected a large amount of information about traditional Chinese craftsmanship and intangible cultural heritage, and selected 14 out of them for more detailed analysis and comparison, and finally selected three. The skills were analysed and summarised in the sense of communication. After many discussions and comparisons, we decided to use mortise and tenon as the entry point for the project to conduct more in-depth exploration and analysis.

However, it is challenging to spread such traditional Chinese handicrafts in Italy. Due to differences in language and culture, how to make Italians willing to contact our projects is also the most extended and most modified part of our discussion cycle. After many revisions and analyses, we decided to use modern technology to interpret traditional techniques. In the discussion of what kind of technology and

display methods are used, we analyse the way of displaying local culture from European countries. Through a large number of case studies, we decided to use motion capture-gesture interaction to let users. There is a connection with the screen. When the primary users interact, it also allows other users to be rewarded. So in the final scenario (chapter Seven), we use a full-face interactive screen, divided into the main interactive screen (interchangeable area) and information display screen (non-interactive area), and Two sides of the operator's hand are placed with a squat structure, effectively isolating the operator and the viewer to ensure that the operator's effective operating range is not disturbed.

In the way of expressing and transmitting information, we use an Italian missionary as the "interlocutor" inside the project to talk with the users who operate the screen, guiding the user to complete a series of explorations and research, and finally end the whole activity. This is a total emotion, allowing users to trust such an interactive system and to understand and understand traditional Chinese culture in such an order.

However, due to our technical and financial constraints, we can only show the project in a high-fidelity way in Chapter Seven. Due to technical limitations, there is currently no right solution to solve the long-distance gesture interaction. The problem, but we hope that if there are relevant studios, companies and other people who can have a better ending plan, we can finally make such a project into a real project.

Finally, we sincerely emphasise that our ideas currently seem to be impossible to achieve perfection, because it involves multiple issues in various fields such as technology, culture, history and science, and further research on usability testing is needed. More feedback. It is unpredictable for future technological development. Still, I hope that the projects we are studying can be used in European exhibitions and affect more people to pay attention to traditional Chinese handicrafts and classical Chinese furniture.

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