

Research on Interactive Visual Design using programs from the perspective of Service design -- A case study of Yunyu Dunhuang

Cuiwei Zhang

Wuhan Textile University, Wuhan 430000, China

Abstract. Objective In order to show the particularity of the cultural development of "intangible cultural heritage" under the background of the digital age, to study how to introduce service design thinking to improve user experience, and to explore the sustainable development of "intangible cultural heritage" culture. The main method is to analyze the problem from the perspective of service design. This article takes the mini program of "Traveling in Dunhuang" as an example. Through the thinking analysis of the service design of the entire project, the design process of the mini program is analyzed, the user is deeply investigated, and the service is analyzed and implemented. The design concept, and finally a general conclusion on the application of service design thinking through analysis. Service design is an important means of digital transformation. This also shows that service design thinking can better adapt to the development of the digital age and provide for the inheritance of "intangible cultural heritage". New ideas and methods.

Keywords: Service Design, Tools, Mini Program Development, Intangible Cultural Heritage.

1. Service design concepts and methods

1.1 Service design concept

Service design is a special way of design thinking, which provides better contact and service experience for people, people and machinery. It can be seen that the research object of service design starts from users or customers, and through different needs of users or customers, service design experience will appear at different contact points due to different needs. Make the user and the product can be more useful, available, efficient and effective mutual service. The key to service design is "user first + tracking experience process + involving all touch points + committed to creating a perfect user experience". We strictly follow this design process in the application and practice process, starting from the user or customer research, closely tracking the research object, and finally analyzing the research results, which can also be seen. The whole process will involve many fields such as user psychology, management, program engineering technology and so on, just like Mark. Stikdorn said that service design is a way to cross disciplines. Driven by it, more potential functions of sunset industries can be explored, and more new business models can be created for the society under the premise of understanding users' needs [1]. Under the development of the knowledge-driven economic system under the background of digitalization, service design can be developed. Service design has become an essential link.

Since 1930, John Dewey first proposed Interaction Design in his book *Art as Experience* (1930). This was a sign that service design had been brought to the attention of mankind, and then on January 4, 1949, IBM's Thomas J. Watson ran an AD in the *New York Daily Mirror* for "IBM Means Service" and in 1962, Total Quality Management (TQM) is proposed to prove that mankind has embarked on the exploration of service design.

Beginning in the 1980s, the development was at its peak, and a large number of theoretical literature appeared, such as: G. Lynn Shostack in his papers *How to Design a Service* (1982) and *Designing Services That Deliver* (1982). The concept of Service Design was first proposed in 1984. In 1986, Donald A. Norman's Research Lab at the University of California published *User-Centered System Design: New Perspectives on Human-Computer Interaction* (User-centered system design: New Perspectives in Human-Computer Interaction, 1986), the first communication Management

system Customer Relationship Management (CRM) software system was born at the same time; In 1988, the SERVQUAL tool for evaluating service quality was developed;

In the 1990s, it was in a state of continuous development; In 1990, Booms and Bitner created the Servicescapes Model to reflect the way behavioral psychology influences service design. In 1991, service Design was formally proposed as a discipline in the field of design, and Bill and Gillian Hollins published "Total Design: Managing the Design Process in the Service Sector "(1991), the same year that IDEO, the world's leading design consulting firm, was founded; In 1998, Hugh Beyer and Karen Holtzblatt proposed a Contextual Design process that is contextual. In 1999, Harvard University Press published The Experience Economy by B. Joseph Pine II and James H. Gilmore (Experience Economy, 1999).

The 21st century began to flourish. In 2001, the first design consulting company for service design, Live! work, was born. In 2002, IDEO incorporated service design into its design content, and Mindlab, the earliest service design group for public institutions, was born. In 2003, Engine transformed itself into the second design consulting firm to focus on service design. In 2004, "service-oriented logic" was proposed in the marketing field, and the International Service Design Alliance SDN was established; In 2008, the more official concept of "service design" was defined; In 2010, Marc Stickdorn and Jakob Schneider jointly completed This is Service Design Thinking: Basic-Tools-Cases (Service Design Thinking: Basic Knowledge - Methods and Tools - Cases,2010); In 2016, the International Service Design Alliance (SDN) has designated June 1 as Service Design Day every year. In 2017, the four main authors, Marc Stickdorn, Adam Lawrence, Markus Hormess and Jakob Schneider, further improved the five basic principles of service design by using service design thinking. On January 10, 2019, the Ministry of Commerce, the Ministry of Finance and the General Administration of Customs issued the Guidance Catalogue of Key Development Areas of Service Outsourcing Industry (2018 edition), and its main development time points are shown in Figure 1.

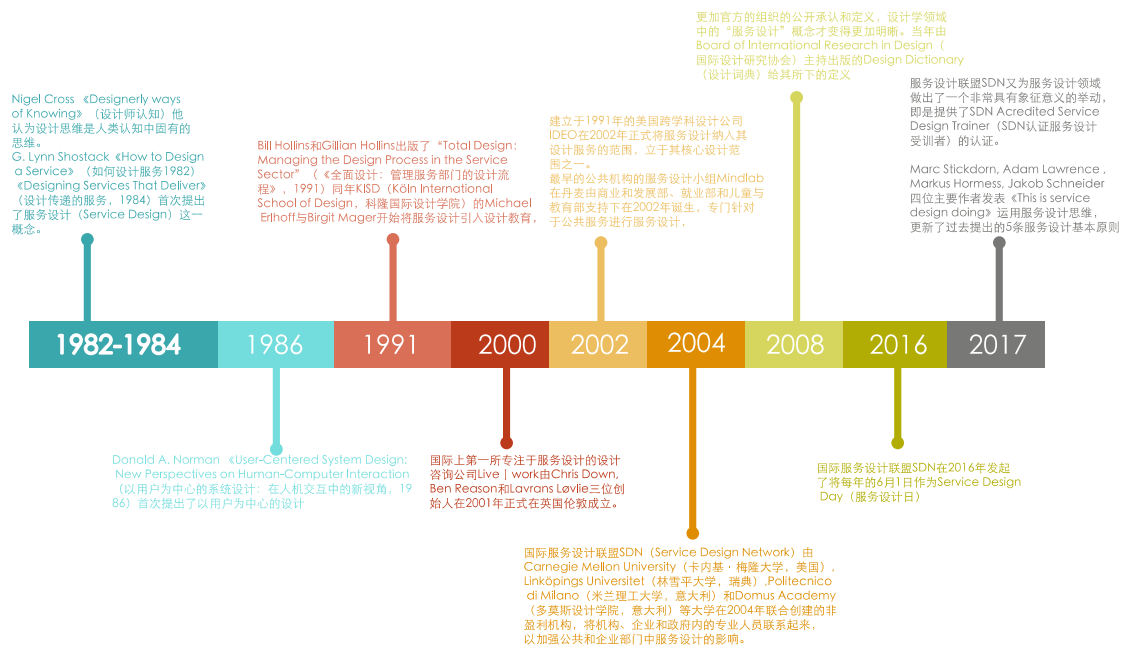


Figure 1. Main time points of service design development

1.2 Basic methods of service design

Service design itself is a complex interdisciplinary discipline, which involves psychology, anthropology, management and other disciplines, and the field of design also contains a lot of content, which can be integrated with various disciplines. As Mark Stikdorn says in Service Design Thinking, service design is an interdisciplinary approach; Stephen Moritz also discusses that "service design helps to innovate or improve existing services, making services more useful, more available, more

desirable for customers, and more efficient and effective for organizations." WIt is a new, comprehensive, multidisciplinary, integrated field." [1]

The design center of service design is users or customers. Service design is a complex interdisciplinary subject with many design elements to be considered and needs to be analyzed in accordance with specific projects. However, it can never be separated from stakeholders, touchpoints, offering, service, etc. The four key points of process are studied. In Service Design Thinking, author Jacob. Schneider and Mark Stikdorn also explicitly put forward five basic principles of service design thinking: 1. User-centered (services should be experienced by customers); 2. Co-creation (all stakeholders should participate in the service design process); 3. Order (services should be represented through a series of interrelated actions); 4. Physical goods (intangible services should be included in physical products); 5. Integrity (the overall environment of the service should be taken into account) [1]. It can be seen that the basic design method of service design must start from the above aspects to provide better products to achieve the purpose of service.

1.3 Service design with small program as the starting point

Swedish scholar Joel Marsh answers what is experience through the user's feeling, thinking, needs, belief, memory and consciousness; Joseph Pine, founder of the famous American company Cofounder of Aurora, pointed out that service is an intangible activity tailored to the individual needs of customers, and experience is a comprehensive feeling formed by a person's psychological, physiological, intellectual and spiritual levels in a highly stimulated state. It has the characteristics of entertainment, education, aesthetics and avoidance [2]. Therefore, we can carefully analyze and design user feelings through this path, and finally give feedbacks to users through various practical embodiment projects, such as: Small programs, applications (apps), web pages, interactive devices, etc., this paper will discuss the service design thinking contained in small programs, using service design tools and methods, Through the use of methods and tools in the four stages of Discover, Define, Develop and Deliver [3], the potential motivations of stakeholders are gradually explored through the interactive application of a simple mini program interface. Implement the AT-ONE rule of service design (taking user experience as the center, focusing on the difference between products and services), gain insight into user pain points to solve problems, realize the value of user experience in the use of small programs, and meet user expectations of service upgrades.

2. Domestic contemporary "intangible cultural heritage" mini program

2.1 Analysis of development status

This paper mainly analyzes the research of "Cloud Tour Dunhuang" mini program under the method of service design, and here the three competing mini programs of "Nanjing Intangible Cultural Heritage", "Pudong Memory" and "Guangdong intangible cultural heritage" are taken as comparative cases. "Nanjing Intangible cultural Heritage" mini program has a unique color system, and the functional sections are clear, including "Intangible cultural heritage headlines", "intangible cultural heritage overview" and "dynamic quick report", etc. At the same time, through the mini program, you can hold "cloud exhibition", through "cloud sharing", "cloud class", "cloud travel" and other online exhibitions, interact with the city's intangible cultural heritage activities at any time, and tell non-genetic inheritance stories through the mini program. To share the status quo of Nanjing's intangible cultural heritage protection and development, the main contents are shown in Figure 2.



Figure 2. Screenshot of "Nanjing Intangible cultural Heritage" mini program

Shanghai, as an international metropolis, has the emergence of new culture every day, and the integration of different cultures every day. The development of cultural industry in Shanghai can be described as 72 changes. In 2020, the cloud experience of cultural development will be held in Pudong New Area. The whole mini program includes the experience, sub-venue, game entry, exhibition, tourism, talent show, exhibition and market platform of 79 intangible cultural heritage projects in Pudong New Area. However, the content and form of the mini program developed for this activity have not been optimized too much. Basically, all the content is directly listed and the basic interaction mode of wechat mini program is selected. The basic interactive experience of one-click to the bottom is shown in Figure 3.



Figure 3. Screenshot of "Pudong Memory" mini program

The mini program "Guangdong Intangible Cultural Heritage" released by the Intangible Cultural Heritage Office of Guangdong Provincial Department of Culture and Tourism was officially launched in September 2019. As an official platform for the implementation of intangible cultural heritage protection and the dissemination and activation of intangible cultural heritage in Guangdong Province, users can learn about intangible cultural heritage and its development and protection in real time through wechat mini program, and the whole program also chooses a one-stop basic interaction mode. The dissemination of information is realized through the wheel casting chart and the full-screen sliding window, as shown in Figure 4.



Figure 4. Screenshot of "Guangdong Intangible cultural Heritage" mini program

2.2 Defects and deficiencies of competing products

From the above analysis of competitive products, it is not difficult to see that the interaction mode of the three mini programs is similar, and the user's service design experience is similar, and their purpose is mainly to share and disseminate information. However, the hesitation in simple interaction mode and single service design purpose lead to many shortcomings of the three mini programs, which can be more clearly defined by the comparison of the following table as Table 1:

Table 1. Comparison of contents of three mini programs under service design thinking

对比内容	南京非遗	浦东记忆	广东非遗
用户浏览量（首月）	3w	5w	2w
转发量（首月）	5k	6.5k	2k
交互方式	一站式页面跳转	一站式页面跳转	一站式页面跳转
界面设计	有一定的文化特色，将非遗的纹饰运用于UI的图标上	没有文化特色，几何的图标设计	没有文化特色，开发版图标运用
首页板块（个）	3个	3个	3个
故事版是否完整	是，有单独的故事版页	较完整，根据展览的内容讲述非遗故事内容，但是没有单独的故事版页	没有非遗文化传承故事板块
是否拥有用户画像	否	否	否
服务模式处于什么阶段	幼稚期	幼稚期	幼稚期
是否有品牌管理和维护	否	否	否
是否存在子链接跳转	否	否	否

It is not difficult to see from the screenshot and table analysis above that there are many problems in the development of service design thinking of these three competing products, such as the lack of recognition among users, the lack of research and analysis of users and customers, the lack of product functions, the lack of product management and maintenance, the lack of innovative service thinking, and the lack of research and development of cultural and creative peripheral products. These are some of the practical problems that need to be improved at present.

3. User research

3.1 User survey of "Cloud Tour Dunhuang" based on service design thinking

"Cloud tour Dunhuang" mini program is a small online "cloud tour" mini program developed by Tencent, they have their own unique set of research and development methods, the same in the mini program user research also follows Tencent's questionnaire survey method, a more in-depth

understanding of user needs. The convenience of questionnaire is that it can collect a large amount of data and analyze it in a short period of time. Based on the perspective of service design, questionnaire survey can be more humanized, and the five principles of service design thinking can be thoroughly carried out throughout the questionnaire process, which can optimize user needs from objectives to report writing. From this, it can also be seen that the questionnaire survey process is shown in Figure 5[4].

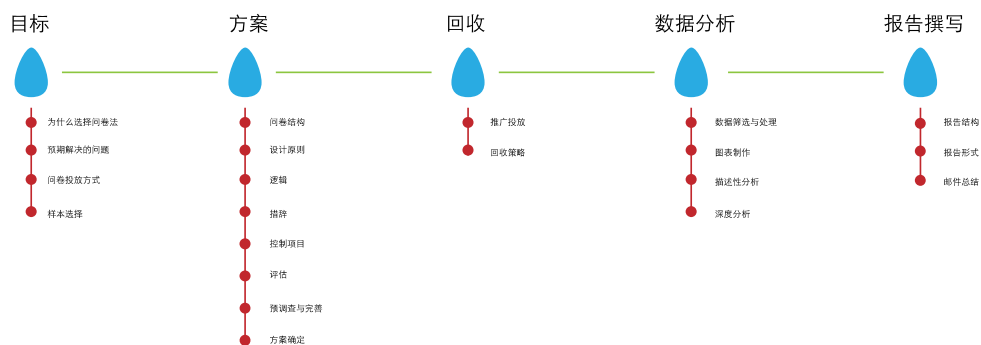


Figure 5. Questionnaire survey process

Through the above process, the survey users are targeted. At the same time, various small tests such as usability test, eye tracking test and user interview are also interspersed in the questionnaire process to improve the above questionnaire survey process and better reflect the service design thinking in every link.

3.2 Service touch point analysis

From the perspective of service design, the existence of touchpoints is to further narrow the distance between users and products. As Noessl said at a conference in 2006, the main focus of touchpoint design in service is to enable users to understand the brand, and the most important thing in this design is to pay close attention to users' goals [5]. And a complete and systematic service touch point design can clearly understand the user's habits and pain points and through these data, the whole more complete, unified, and adaptable products, as a mature and excellent enterprise, Tencent Group also has its own unique touch point design scheme, professor Qin Jingyan of the Department of Industrial Design of the University of Science and Technology Beijing has mentioned in her academic report: Service touch points can be connected with Buddhism, including seeing, hearing, God, mind, and dwelling. In service touch points, we often explore user needs through heavenly eyes, heavenly ears, and other minds [7].

For individuals, 80% to 90% of the way to obtain information is through the eyes, and the movement trajectory and movement frequency of the eyes are explored according to certain rules. Tencent completes the eye movement test through the eye tracker, so as to record the movement process of the user's line of sight when browsing the page and the movement frequency of different plates. Through the test results of tappers, users' browsing behavior can be more clearly understood and service design touchpoints can be further improved. Eye movement test data indicators include residence time, line of sight map, heat map, block exposure, etc. For example, using eye movement heat map will display the line of sight distribution of experimental users, red represents dense, followed by yellow and purple areas, and the area without color represents zero eye contact. The line of sight map can display the line of sight of different users when browsing the page. Each color represents a user, and the more circles, the more users browse, and the larger the circle, the more careful the browsing.

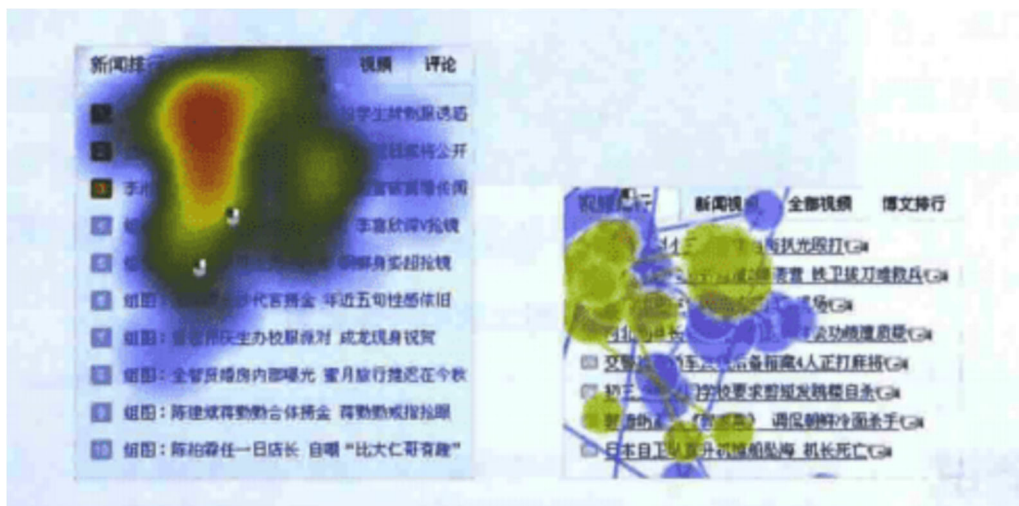


Figure 6. Eye movement heat map and line of sight trace

A large amount of experimental data is collected through eye movement thermal map and eye track diagram, and the service contact points are repeated again and again, so as to achieve zero barrier use between users and products, and achieve the purpose of service design.

3.3 Features of project innovation under service design

In the context of service design, with the advent of the "people" -centered big data era, service design makes users the starting point and center of information dissemination, giving users the content they are really interested in and enabling them to share and disseminate information spontaneously. As video websites, shopping websites, vertical websites, Weibo, wechat and mobile apps have gradually become the main ways of new media development, the huge traffic attracted by them also means a large number of service motives behind it, and also gives birth to a new innovative feature of service design: personalized service experience. The concept of "personalized" service design concept implements the principle of simplifying complexity, bold innovation, agile acquisition, and provides users with a new browsing service experience.

4. Small program design research and analysis

4.1 User Portrait

Citing the research results of western pioneers on user portraits, Pruitt &Adlan put forward the concept of Persona Lifecycle. They believe that persona design is similar to the birth and growth process of human beings, including 5 stages: Planning, conception, gestation, birth and maturity, adulthood, lifelong achievement and retirement [6]; Using the model of character cycle, the developer made user portraits of the target customers in Dunhuang to determine that the object of use of the product is mainly the post-80s and post-90s tourists, who prefer simple design style and most seek a sense of painting, so it is determined to restore the original scene of the mural with high-definition realistic pictures. Fashion has its own independent insight into culture which provided the initial idea for the product to provide a personalized home interface user portrait specific content Figure 7.

用户画像	性别	职业	年龄	获取信息方式	页面喜好
	女	白领	90后	微信公众号推送 朋友圈转发	小清新
	男	公务员	80后	朋友圈转发 微博推送	无特殊喜好 不复杂就好
	男	学生	00后	朋友圈转发 个人喜好关注	简约、阅读 性强、操作 简单易懂

Figure 7. User portrait legend

4.2 User Requirements

Through the above portraits, I have understood the main audience groups, and then further determined the deep needs of target users by classifying these groups, met their needs through service design concepts, introduced user contact points through digital services, and learned that the murals in Dunhuang Grottoes will cause carbon dioxide and water vapor caused by a large number of tourists. It will have an impact on the murals, and it is known that it is difficult to get a ticket to visit the scenic spot in the tourist season, because the development team sorted out the existing practical problems and conducted a large number of online questionnaires, and found that tourists have similar ideas in the tour process: 1, how to independently understand the culture of Dunhuang Grottoes. 2. What is the impression? How can you extend this moving? 3. How to better share this feeling with friends and relatives? These are a few outstanding problems. In addition, I also made a detailed visit and follow-up survey on the guardians of the Mogao Grottoes to understand the functions and status quo of various organizations, with the purpose of reflecting the research and investigation that the service design concept of the product has always been carried out around the users.

4.3 User data analysis

Through the above user portraits, the research object is determined, and then the target users are targeted by the division of groups, and the in-depth analysis of the needs of the target customers is conducted. In addition, the team finds the importance of "stakeholders" during the research process. Therefore, the design scheme of the mini program is to build a user-centered cultural and artistic tour of Dunhuang Grottoes, helping users to explore, visit and protect the Dunhuang Grottoes online. The essence of service design is a user-centered all-round introduction, so users can understand the knowledge of Dunhuang Grottoes through this product, and realize online play, and harvest their own Dunhuang personalized cultural and creative products in the unique travel experience. On the other hand, we can understand the status quo of the protection of Dunhuang Grottoes, the diseases of cultural relics, the influence of temperature and humidity on the murals, and the knowledge of popular science protection. At the same time, the functional framework diagram of the mini program is basically drawn through the investigation and collation of the data, as shown in Figure 8.



Figure 8. Yunyu Dunhuang product architecture diagram

4.4 Small program interaction process analysis

The running background of the small program is based on the operation of the wechat platform on the one hand, which greatly saves the development cost and on the other hand, plays a better communication effect, and spreads and shares the product in the simplest and fastest way. Under the background of service design, the home page of the small program has a real-time update function, pushing different murals for you in units of days, and the navigation bar at the end of the page contains five plates, including home page, exploration, tour, protection and new new cultural creation, each plate contains multiple sub-pages to jump, using the two interactive modes of wheel and wheel diagram to reflect a stronger sense of space.

4.5 Design scheme analysis

The UI design of the mini program is also a lot of in-depth research, under the creative thinking concept of service design, reflecting the user-centered service process of the mini program, the product strives to be 100% online restoration of Dunhuang culture, the first key problem is that the Dunhuang murals are painted on the wall, and the texture and texture need to be displayed is not paper but the wall. In order to get closer to the feeling of the "wall" in Dunhuang Grottoes, all the card designs were translated into stone designs. The visual style Settings of stones included rounded corners, shadows, textures and aspect ratio. These parameters were adjusted to highlight the thickness, weight and realistic stone texture of stones, in order to meet the visual needs of users during field trips, as shown in Figure 9.



Figure 9. Cloud tour Dunhuang UI screenshot

After highlighting the texture of the walls of Dunhuang murals, another important issue has also been raised. The main sources of traditional pigments in Dunhuang are local ores, imported gems and some synthetic pigments. Therefore, the selection of colors in the UI design of small programs has become particularly important. From the perspective of service design, the visual color extraction of products can quickly catch users' eyes and reflect the "intangible cultural heritage". In the investigation, it is found that the color has its own symbolic meaning; Cinnabar is red, symbolizing good luck. Lapis lazuli and malachite are green, symbolizing vitality. The monk is yellow, symbolizing the land. Ochre is brown, which is the main representative color of Dunhuang murals. Therefore, the five stripped colors are also used as the theme colors of the applet as shown in Figure 10.



Figure 10. Cloud tour Dunhuang color selection

5. Conclusion

In the context of the growing economic level, functional products and experiences can no longer meet the needs of contemporary users. Only the service design experience with interactive emotion can narrow the distance between products and users. The service design concept is used to create a small program of "Cloud tour Dunhuang", and the whole process runs through the user-centered design concept to accurately capture user needs. The dissemination and development of Dunhuang culture has a new initial experience, while creating cultural and creative iterative products to meet the personalized customization needs of users, support the rich "intangible cultural heritage" cultural heritage, making the brand in the inheritance of the extraordinary position. On the premise of catering to the whole new service experience of users, it also attracts the new generation of forces, providing new ideas and opportunities for the improvement of the brand and the inheritance of "intangible cultural heritage" culture, and promoting the ecological development of Dunhuang's intangible cultural heritage economy.

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