# Flow Museum of Symphony

**A trial to reshape a sound-based museum experience with digitalization and community**

*“How will design help to reach a better future of human beings? Maybe starting with the museum is a nice choice. Museum, Music, Culture, Civilization……they cannot solve all the pain, but with them, we are richer in some way.”*

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# Flow Museum of Symphony

## A trial to reshape a sound-based museum experience with digitalization and community


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# Abstract

Since the emergence of digital museum, it has been adhering to the educational goal of museum itself, and constantly improving the effect of information transmission and public experience. However, mainstream digital museum cases and technological development are all focused on visual exhibits or museums focusing on visual exhibit information, which are limited by the physiological and psychological processing efficiency of acoustic information. Digital museums focusing on acoustic or acoustic information are rarely seen. Due to the limited effect of the current digital museum scheme on the transmission of exhibition information and the improvement of public experience, a new scheme is needed to solve the above problems. But the author sees potential in community design, which focusing on constructing emotional relationship between culture and public, also within public.

In this thesis, the author tried to remove obstacles for the public, physically by breaking the walls into community, digitally with computer technology and digitalized interactions, so that public in an easier way to join museum visiting activity. The whole work targets to build the public a complete knowledge system in the form of interactive gaming and engage them with temporary relationship built upon music via this game, to eventually improve effectiveness of information communicating between public and the museum, what's more, reshape a higher level of visiting experience of the museum. This thesis works on a sound-based museum, Shanghai Symphony Museum (shortened as SSM), as a trial, with the help of interactive system and space music recommendation, establishing music and cultural center of the city.

The final solution Flow Museum of Symphony, a serendipity system based on a set of multi-media interactive installation in the open-air. With the system, Public could collaborate to turn on a piece of classic symphony as space music in the district that matches with the body movement (alone or collaborating)/ weather/ ambient sound at the moment, regardless of their demographic/ knowledge/ financial/ digitalized level.

**The article provides to see the possibility to converge the music and music related information into a digitalized interactive game, and the basic principles to build one.** Risks of the sound-based museum into public space is also discussed.



**Keywords**

sound-based museum; symphony education; digital museum; interactive installation; serendipity

# Abstract

Dall'emergere del museo digitale, esso ha aderito all'obiettivo educativo del museo stesso, e ha costantemente migliorato l'effetto della trasmissione delle informazioni e l'esperienza del pubblico. Tuttavia, i casi di musei digitali tradizionali e lo sviluppo tecnologico sono tutti concentrati su esposizioni visive o musei che si concentrano su informazioni visive, che sono limitate dall'efficienza fisiologica e psicologica di elaborazione delle informazioni acustiche. I musei digitali che si concentrano sulle informazioni acustiche o acustiche si vedono raramente. A causa dell'effetto limitato dell'attuale schema del museo digitale sulla trasmissione delle informazioni espositive e sul miglioramento dell'esperienza del pubblico, è necessario un nuovo schema per risolvere i problemi di cui sopra. Ma l'autore vede il potenziale nel community design, che si concentra sulla costruzione di un rapporto emotivo tra cultura e pubblico, anche all'interno del pubblico.
In questa tesi, l'autore ha cercato di rimuovere gli ostacoli per il pubblico, fisicamente rompendo i muri nella comunità, digitalmente con la tecnologia del computer e le interazioni digitalizzate, in modo che il pubblico in un modo più facile per unirsi all'attività di visita del museo. L'intero lavoro mira a costruire un sistema di conoscenza completo per il pubblico sotto forma di gioco interattivo e a coinvolgerlo con una relazione temporanea costruita sulla musica attraverso questo gioco, per migliorare alla fine l'efficacia della comunicazione delle informazioni tra il pubblico e il museo, e per di più, rimodellare un livello superiore di esperienza di visita del museo. Questa tesi lavora su un museo basato sul suono, Shanghai Symphony Museum (abbreviato come SSM), come una prova, con l'aiuto del sistema interattivo e la raccomandazione della musica spaziale, stabilendo la musica e il centro culturale della città.
La soluzione finale Flow Museum of Symphony, un sistema di serendipità basato su una serie di installazioni multimediali interattive all'aperto. Con il sistema, il pubblico potrebbe collaborare per accendere un pezzo di sinfonia classica come musica spaziale nel quartiere che corrisponde al movimento del corpo (da solo o in collaborazione) / al tempo / al suono ambientale al momento, indipendentemente dal loro livello demografico / conoscenza / finanziario / digitalizzato.
**L'articolo prevede di vedere la possibilità di far convergere la musica e le informazioni relative alla musica in un gioco interattivo digitalizzato, e i principi di base per costruirne uno.** Vengono anche discussi i rischi del museo basato sul suono nello spazio pubblico.



**Keywords**
museo basato sul suono; educazione sinfonica; museo digitale; installazione interattiva; serendipity

# Introduction

The Museum of Symphonic Music is a traditional museum that is of great significance in the history of Chinese symphonic music. However, the limited capacity of the museum, the limitation of form of the music, the high learning threshold of symphony, and the exclusivity of the cultural circle, all have established physical and cognitive barriers between the museum and the public. The performance as a museum is to be improved. As a socially beneficial institution, museums need to contribute better to the delivery of civilizational information. This requires that museums always consider a better combination of education and entertainment, and constantly improve accessibility to the public. Digital museums, compared to traditional museums, use digital technology to effectively improve accessibility and visitor interactivity. The digital museum industry is now focusing on how to implement technology to enhance the delivery of information and the visitor experience level. At the individual level, with the rapid development of science and technology, the psychological and physical distance between us is increasing. Finding a circle and seeking for identity is not a unique feature of the Gen Z, but the pursuit of every social individual in the current era. Whether a balance can be found between Isolation and Identity Commitment is a question worth exploring in design.

In this context, There is a primary problem, which is how can symphony museums better convey cultural values. Further deconstructed, it can be understood as: how to make the symphony museum have a wider influence, and the public has a higher willingness to participate in cultural activities for the symphony, so as to enhance cultural understanding. Translated into product design questions, we have to answer how might we break the physical barrier between people and museums, break the knowledge gap between the public and the symphony, and shorten the social distance between cultural circles through design.

Existing solutions in the digital museum industry focus on visual exhibit-based museum experiences, and have limited effect on museums with vastly different and appealing information processing methods for acoustical information-related exhibits. Therefore, a new solution is demanded to enhance the exhibition effect and viewing experience of acoustic and acoustic information themed museums.

Besides, it is difficult to break through the social distance, because symphony-related events are mostly held in megacities, and ticket prices are high, and the middle and new middle class are the main audiences. The lack of listening channels brings cognitive barriers, and the lack of unified music promotion and management for classical music and symphony on mainstream music platforms makes it difficult for non-fans to get access to them, let alone to actively search and listen to them. In a related way, the public's lack of basic understanding and knowledge of the symphony has prevented it from reaching the masses. Because the classical content of symphonies is not rich enough compared with other music types, the lack of basic appreciation will make people

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feel that this kind of music is even a little "boring", which hinders the willingness of non-lovers or the majority of the public to further understand. This is also the professional promotion of the Shanghai Symphony Orchestra, the host of the symphony museum. Last but not the least, China is dominated by comprehensive and historical museums, accounting for 71.6% of the total number of exhibition halls (State Cultural Relics Bureau, 2021). The museum audience interviewed regarded "going to the museum" as a serious matter, and was discouraged by the involuntary and restrictive nature. Public education methods are a bit backward: The industry believes that most museums in China are still designed for one-way information transmission rather than interaction, and the consequence is definitely not overwhelmed by the industry comparing with the one brought by "education and fun" concept in some countries in advanced position worldwide. Last but not the least, the issue of museum profitability is still the primary issue of survival. In interviews with practitioners and the curator of the Shanghai Symphony Museum, they all mentioned their worries about monetization. Balancing commercialization and cultural value are the most troubling issues that bothers them.

**The barriers of physical space and knowledge gap are promising to be eliminated with the help of technology used in digital museum**, and information can be "backed up" in various forms to obtain a clone. Interactive device technology is developing towards non-linear, unpredictable, multi-sensory, and strong involvement. Among them, **storytelling is a more effective interactive clue**, while general storytelling clues need to be the theories of general knowledge of the crowd or widespread the spread of the storyline. This thesis sees the potential in the systematic and hierarchical knowledge system of symphony. And the digital transformation of art has the potential to directly bring economic benefits. For example, the Tate Gallery, as a traditional cultural institution, and google art, as an internet technology organization, have relatively successful cases. They give art a life-like, metaphorical connection and interpretation, and use scene-based context and call multiple channels to help the public understand art. They have brought economic benefits to art institutions. **The relationship between the community and the museums is effective to elimitate the threshold of public visiting a museum.** Innovative museum pioneers Museum Oakland Museum of California and Kirkleatham Museum have established a close relationship with the local community through an open museum form and a high degree of involvement in community life. Broader social recognition and emotional links bring traffic.

**A new approach naturally comes out to make full use of the advantages of digital technology and serendipity in public space** to achieve the goal of helping the Symphony Museum to efficiently deliver high-quality information, targeted design for users of different backgrounds and levels, and easy to reach and understand. The business model based on this approach can bring predictable economic benefits and social recognition to the museum.

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Eventually the basic knowledge of symphony is promoted to be the interaction language, also the carrier to inspire new relationship between visitors and drive the atmosphere of the entire neighborhood. The "information" inside the museum flows out breaking the four walls, and the conditional relationship between neighborhood is established in the process of interacting with the system.
( system map)
The key contribution of the solution is that it provides to see the possibility to converge the music and music related information into a digitalized interactive game, and the basic principles to build one. The information of the museum is no longer limited by space and time, and the value can be transmitted to the public anytime and anywhere. It is as accessable as possible to the public of diverse cultural levels and economic levels, with zero burden, entertainment and subjective comprehension of music. And with a relatively low economic cost, economic benefits are leveraged, art and culture are empowered.

Museums is promising to embrace the updating world, and keeps disseminating civilization.

# Methodology of the project

The study ultimately hopes to both effectively validate the effectiveness of the visiting experience and to ensure that stakeholder interests are not with over concession. Therefore, the overall research ultimately requires both an terminal device that can be experienced and evaluated by the potential visitors in a near-realistic environment, and a relatively complete business plan that allows stakeholders to assess its value in real industry.

The starting point for this qualitative research is a unique local museum, which is Shanghai Symphony Museum, with both operating difficulties and experiencing problems. In order to design to help the museum out of the dilemma, my overall research concept follows the double-diamond model:

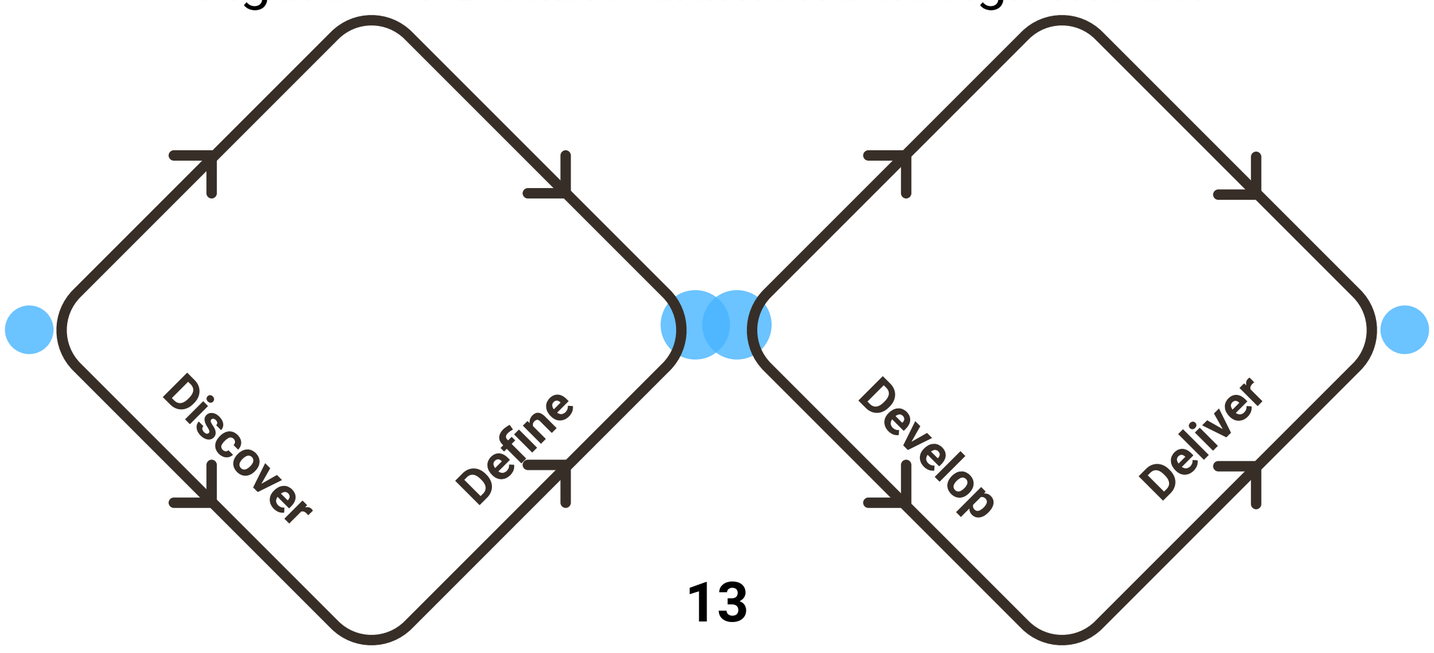
**1. identify and define the problem scenario**. I performed field research, including field visits, observations, stakeholder interviews, and desk research with secondary sources to sort out the main problem to solve, target segments to serve and design objectives of the Shanghai Symphony Museum from the perspectives of social context, policy influence, and industry trends.

**2. Locate design opportunities and ideate them into design solutions**. In order to catch design inspiration, I combined literature review, looking for theoretical basis from the thesis of digital museum, community design and symphony theory, and combined with practical application cases such as community museum and art digitization projects, together with moodbaord to ideate hypothesis for the form of this design grounding. After the research I generated script of business plan and concept storyboard, and gave the initially developed hypothesis and drafts to industry experts for feasibility assessment, as well as to verify the concept acceptability of the concept to potential group of visitors.

**3. Develop prototypes and iterate on design solutions**. Based on the design goals and design concepts, I used Protopie as the prototyping tool to visualize the design solution, and combined it with the Wizard of oz Experiment for user testing. The users' feedback helped me to narrow down and validate the design goals, optimize the interaction principles, and the effectiveness of the perspective layer.

**4. The final deliverables**, includs optimized mid-fi design concepts and prototypes, as well as business plan proposals.

Figure 0.1 Double-diamond design model



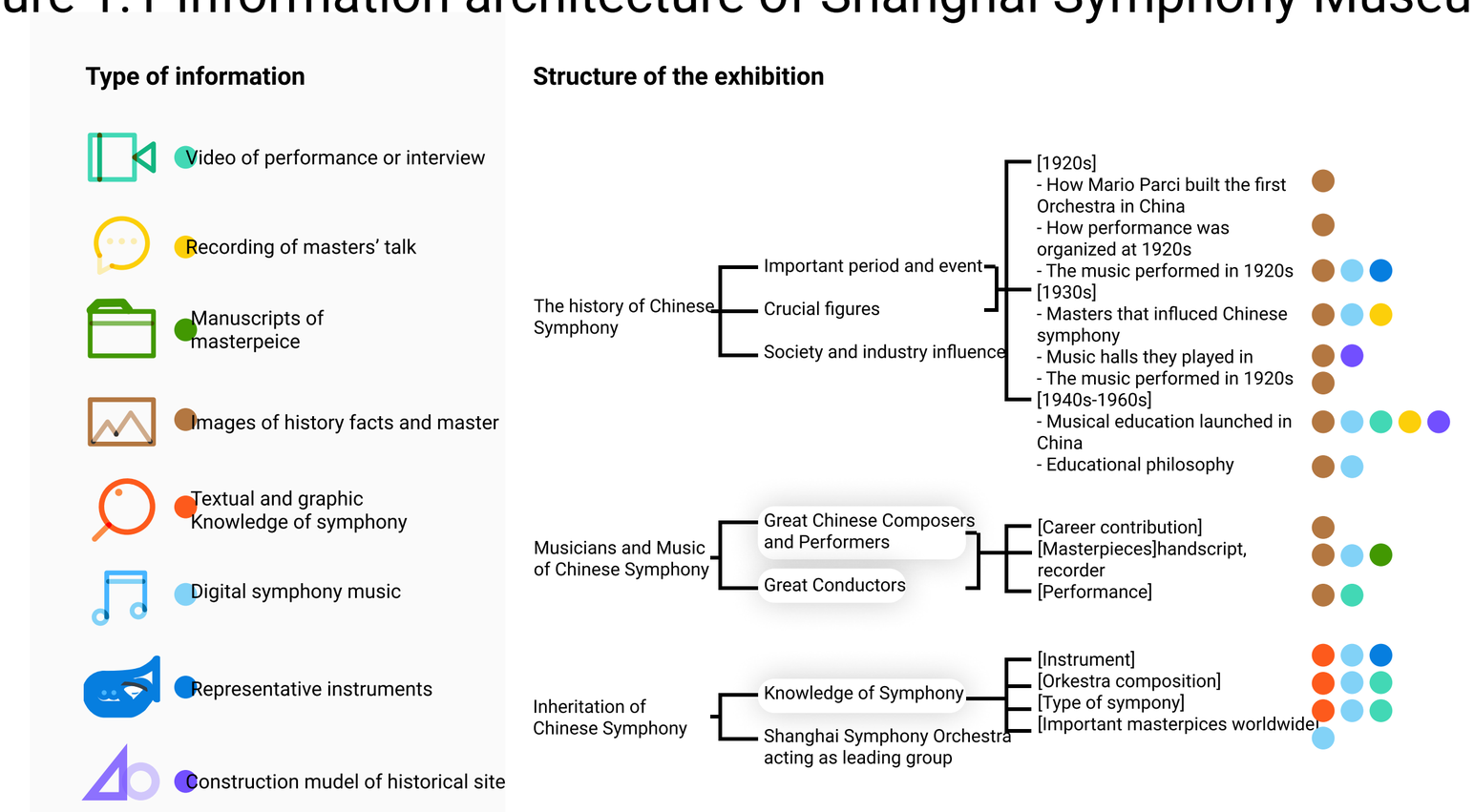
# 1. The Dilemma That SSM is Facing

## 1.1 Background Information of Shanghai Symphony Museum

The Shanghai Symphony Music Museum, a traditional museum with the theme of symphony, was renovated from an old house in Jing'an District backed by the Shanghai Symphony Orchestra and the Shanghai Conservatory of Music. It carries the history of the Chinese symphony represented by the cultural vitality of the Baoqing Road district and the popularization and promotion of the Shanghai Symphony Orchestra to the public. The museum covers an area of about 1k square meters. The exhibition format is a combination of various media materials and historical manuscripts, telling about the development of Chinese symphony, important musicians and works, and basic knowledge of symphony from the beginning of the 20th century to today. It is a combination of the freedom of information characteristics of the analog museum, and the physical limitations of some artefact museums. The museum only allowed 40 people to visit every day (80 people/day before COVID19), and the restriction accompanying with artefact museum is magnified. How to ensure a fully engaged exhibition experience (user's demands) and make the Symphony Museum have a wider influence is the critical painpoint that the museum concerns the most.

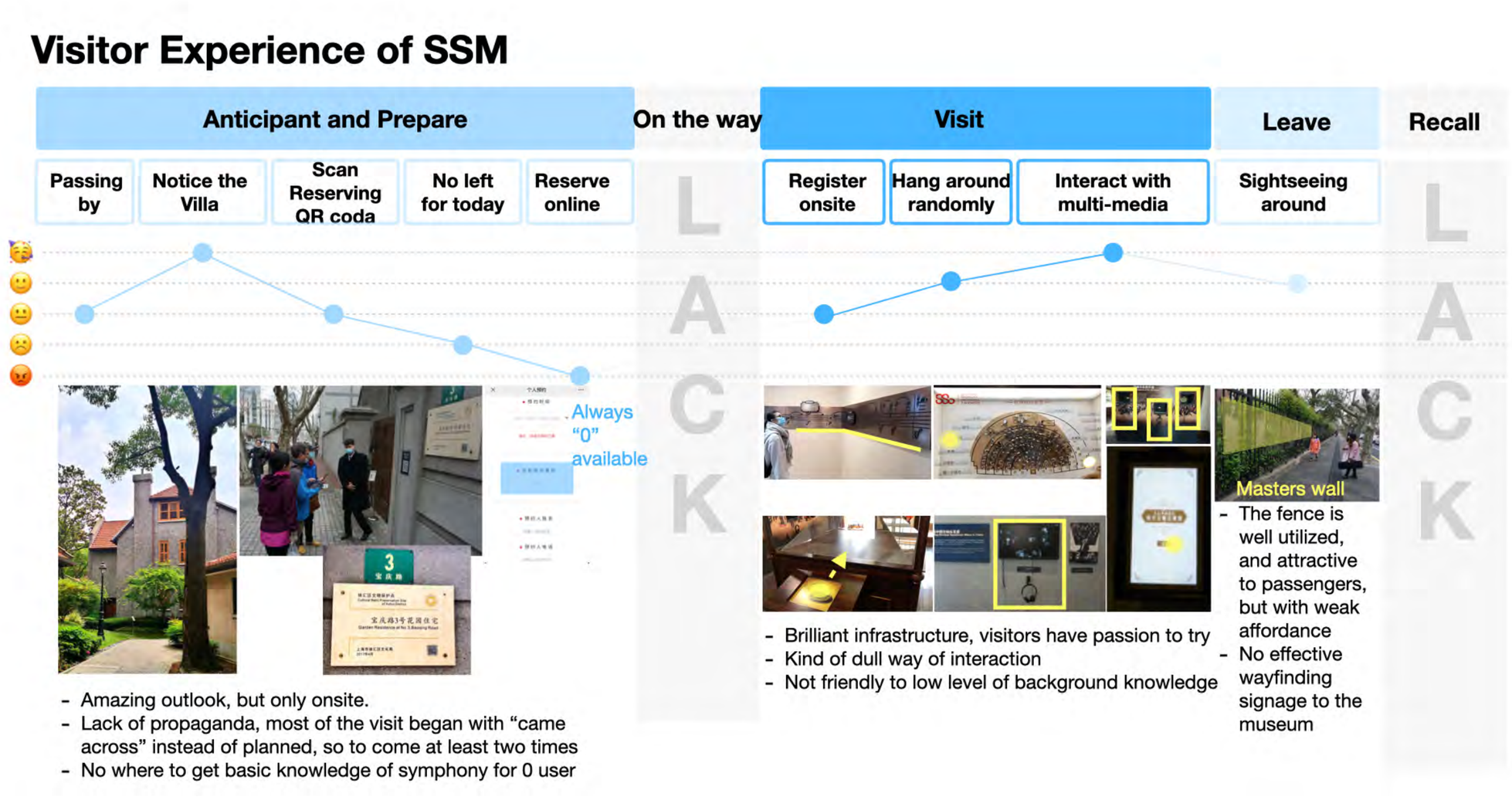
The information hierarchy of the Shanghai Symphony Music Museum is relatively rich, and a specific period of Chinese symphony history and music knowledge will be presented through a variety of information medias. But for the general public, they have no basic knowledge of music theory or even what symphony is. Therefore, only a tiny part of the information is for most people, which is the basic knowledge of symphony in chapter3 the Inheritation of Chinese Symphony, Chapter2 the Musicians and Music of Chinese Symphony that uses classic symphony as the carrier to convey relevant creator background information, and the Chapter1 the History of Chinese Symphony about first-hand Vivid background story of symphonic music. The audience's ability to accept the requirements increased successively.

Figure 1.1 Information architecture of Shanghai Symphony Museum



Using the five key steps to reshape the experience (Clawson and Knetsch, 1966) to evaluate the visitor experience of the Shanghai Symphony Museum, it could be concluded that it mismatched with the visitor's expectation.

Figure 1.2 Visitor expeirence journey of SSM




From the perspective of ordinary audiences and the professional perspective of experience design, the exhibition hall has serious problems: it is limited by the small audience base of the symphony itself and the only way to visit the exhibition hall (only through the WeChat public account), high level of barrier to the exhibition (there are barriers to symphony knowledge that require systematic knowledge, but there is no professional guidance). The above results in the high physical and cognitive cost of visitors to the museum, and the influence of the exhibition hall is therefore restricted.

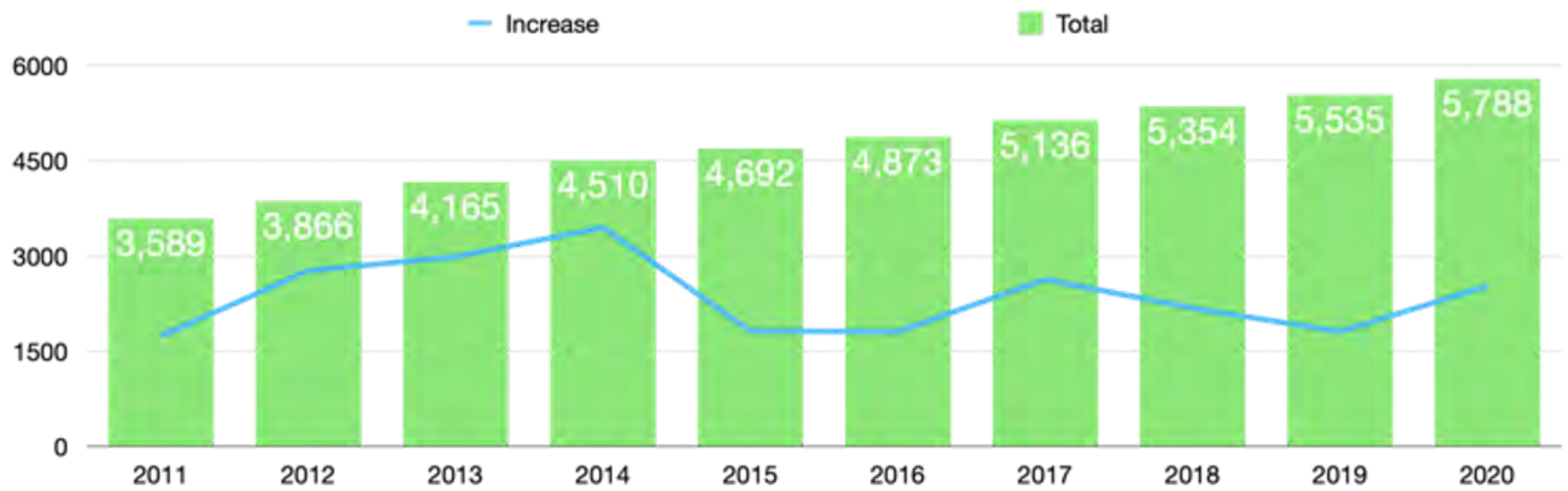
## 1.2 Challenging industry environement that SSM is facing

### 1.2.1 Policies for Chinese museums

Like other public museums in China, the operating expenses of this museum, in addition to the sponsor real estate company, are mainly funded by the government finance. The government needs fixed financial expenditure to be invested in public welfare projects every year. The Culture and Tourism Bureau is the direct management department of the government department for museums. Nearly 50 percent of the operating costs of the Shanghai Symphony Museum, which is free to the whole society, are covered by the Shanghai Culture and Tourism Bureau, while the rest is covered by the sponsor, Shanghai Baoqing Real Estate Company, according to the museum's curator.

China has increased its investment in museums year by year. Since the 13th Five-Year Plan, a new museum has been built every two days in China (State Cultural Relics Bureau, 2021) . However, since 2019, the Ministry of Finance of China has asked to accelerate the free opening of museums and memorials.

Tabel 1.1 The trend of the amount of museums in China from 2011 to 2020

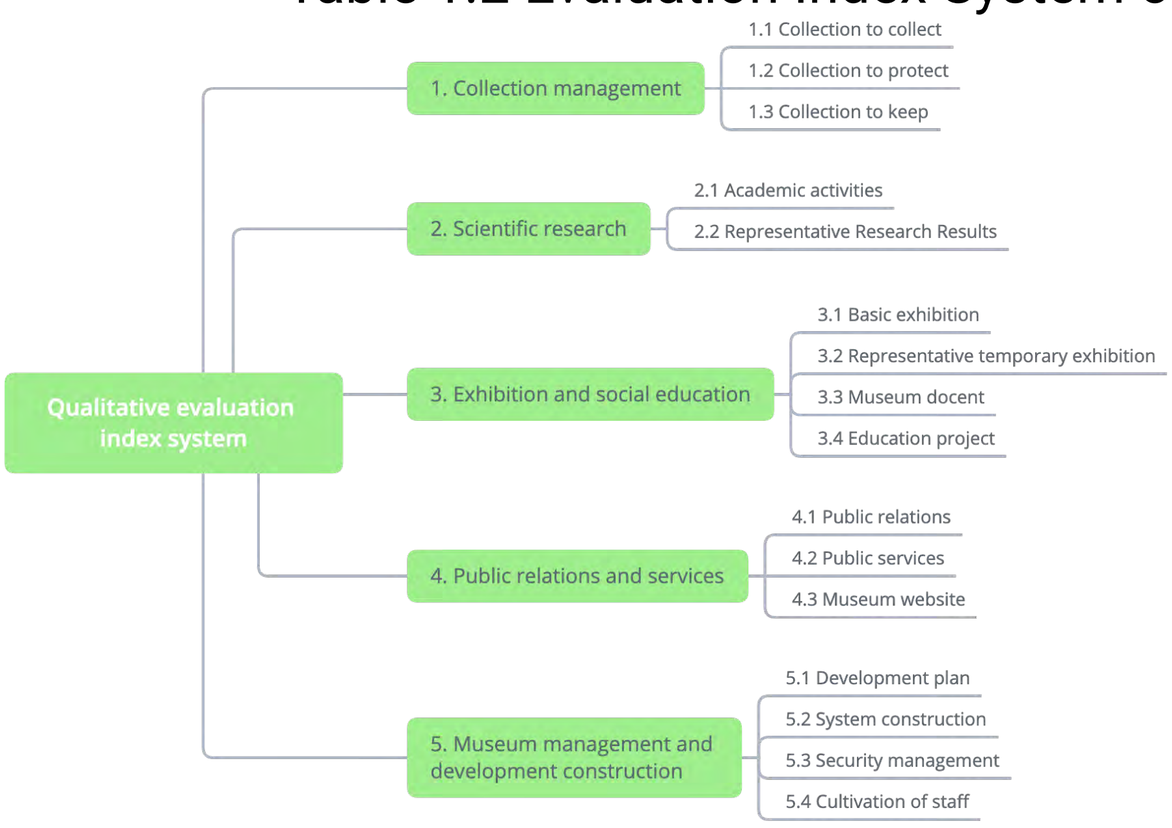


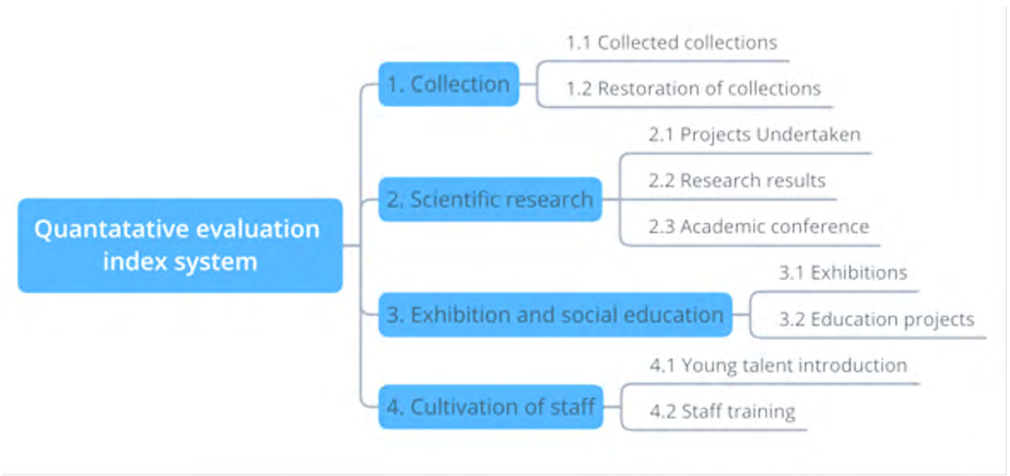

How the museum can survive is also a fatal question. In most other museum cases previously, entrance fees and cultural and creative goods together make up the museum's main revenue. So with the funding from government departments and funders, they can run the museum more easily. After the abolition of ticket revenue, it also accelerates the museum to find new profit models to enhance its vitality, bring people and topics, and feedback the ability of social welfare and added value. As a result, many of China's new pavilions have found a relatively quick way: to develop into "leisure venues" , exhibited and immerged deeply with shopping, leisure, living, instead of an independent experience. This will drive development and attract more people, but these museums are becoming less of a public service and more of a commercial tool.

### 1.2.2 Requirements of museums operating

In addition to the economic support, the Cultural and Tourism Bureau of the Chinese government will also restrict and manage the operation of the museum. In China, local and smaller size museums generally lack unified management standards, on the contrary, China Cultural and Tourism Bureau will evaluate and manage the operation of first-level museums in China  from both qualitative and quantitative dimensions((State Cultural Relics Bureau, 2021), in nearly strict level.

Table 1.2 Evaluation Index System of Chinese 1st-level museums




Shanghai Symphony Museum is not a first-level museum, but they will refer to the corresponding management regulations to make daily operation standards. Two type of measures have been taken by SSM: 1) to improve the quality of exhibition content through expert invitation system; 2) Get out of the museum and spread the social influence of the symphony. Specific practices are as following:

Expert seminar: the contents of the exhibition hall, such as the chronicle of Chinese symphony, selection of historical materials, arrangement, review, and the Family Tree of Chinese symphony schools, are jointly determined by the teachers and musicians of symphony teaching, who are very strict about the theory and genre knowledge of music.

Entering the campus: holding regular open classes in Shanghai and surrounding schools, and popularizing symphonies. However, the qualifications of the teaching staff are relatively high, all of them are musicians of the orchestra, and they should also match the performance time of the orchestra musicians.

The theme temporary exhibitions: A temporary multimedia exhibition hall, recently built for the 100th anniversary of the founding of the Communist Party of China, is part of an extension of the museum that showcases the development of the Chinese symphony over the past 100 years, along with the Chinese people and the Communist Party. However, few people know about this exhibition, because of the limited location, it is a special area on the negative first floor of the Shanghai Symphony Orchestra Concert Hall.

We can feel that the Shanghai Symphony Museum has tried to break through the space limitation in order to bring the symphony closer to the daily life of more of the public. However, the current input-output ratio is not high, which is expressed by the curator that Efforts have been made but with little success. Hence a more appropriate way remains to be explored.
Further to go, combining the current situation of the Shanghai Symphony Museum and the pain points of the stakeholders expressed in the management of the museum, we come to a conclusion to measure the success of the redesign of the museum. **The indicative indicators for local or small size museum operating we should also refer to are as following**:

1) Enhance the protection and utilization of exhibits
2) Reduce museum operating costs
3) Expand the target audience of museum services
4) Improve the efficiency of information transmission
5) Improve the quality of visitors' experience
6) Strengthen the connection between museums and the public
7) Diversify profit methods to improve profitability

### 1.2.3 Stay competitive in the industry: be constructive

Looking back to the development of popular science education in museums, four main stages has been walked through: the first generation is teaching and explanatory, Didactic and Expository; the second is stimulus-response, Stimulus-Response; the third is discovery, Discovery; and the fourth is On behalf of the construction of knowledge, Constructism (Xueyuan Qian, 2007).
**Stage1**-The teaching and explanatory type is similar to traditional school education, and it is still popular in Chinese museums (Yumei Zhang, 2020). The venue interpreters mechanically recite according to the teaching materials, and then provide explanation services for the public in a fixed procedure.
**Stage2**-Although the stimulus-response type emphasizes the method of education and the process of training (Tianjin Chen, 1995) , it still belongs to the traditional education model of "teacher teaching-student learning".
**Stage3**-Cognitive-discovery originated from the cognitive-discovery learning theory proposed by American scholar Bruner in the 1960s, emphasizing and attaching importance to the initiative of students in learning, thinking that learners are not passively accepting knowledge, but actively acquiring knowledge , Build your own knowledge system (Shaobei Xiao, 2001).
**Stage4**-The constructive knowledge type, that is, the inquiry type, originated from the constructivist learning theory formed in the late 1980s (Wei Chen, 2007). Constructivism advocates a student-centered teaching model under the guidance of teachers, and promotes learners to learn actively and cooperatively in the context.
The four types of teaching models are not mutually exclusive and can exist in the pavilion at the same time. At present, many science popularization venues in China are still in the stage of teaching and explaining, training some venue commentators to provide explanation services to visitors according to the template.
However, technology that is almost abused nowadays in some museums does not necessarily guarantee good interactive effects as expected. For example, when searching recent exhibitions and latest museum introductions, it is almost possible to see the so-called "immersive exhibition" using holography, architectural projection and VR, everywhere. From the perspective of interaction design, it can be found that the formalism of equipment and technology is greater than that of information transmission. Industry insiders also worry about the innovative ways of domestic museums. The interaction is a mere formality that satisfies the lack of entertainment and ignores education. After "playing", the knowledge system cannot be established and the original value of museums is lost. Generally speaking, **the principles and competitiveness of Chinese museum design is expected to be:**

1) Native theories for museum planning
2) Educating but engaging for interactive exhibits/installations
3) Humanity and community centered instead of museum or artefact centered

## 1.3 Unique Ideology in China that needs to take into consideration

The gradual increase of small size personal or local museums, and localized characteristics and individualism have been highlighted. They are located in residential areas and it is difficult to find them if they are not professional audiences or targeted recommendations. Disregarding the diversified content of the museum itself, the universal charm of this type of small size local museum is that **it is not recognized by the Most people, yet the cultural identity in the circle is extremely high** (Random interview with the audience of Shantuwan Museum and Shanghai Symphony Museum, total of 8 interviewees). For it being small enough, it attracts the attention of circle insiders more.

**Pouch-in Culture** is the public's pilgrimage to a certain circle cultural center. The process of leading a culture to become the mainstream of society among people may be shorter than in previous times, thanks to the positive impact of the development of information technology and the Internet on cultural communication. Since 2012 in China, the issue of public opinion centralization has been discussed by many researchers. From the centralized communication in the industrial era, to the decentralized communication in the Internet era, to the re-centralized communication today, the media ecological pattern has undergone tremendous changes (Chunhui Luan, 2015). Social media is the main venue for the direction of public opinion and the "centralization" of mainstream ideas. (Bingyao Zhu, 2014). We will be able to observe on Little Red Book, Wechat Moment, Tictok, KOL promoting a second-hand bookstore by planting grass, making a niche artist become a household name overnight, and college students all over China putting a trip to a music festival on their wish lists.

**But this is exactly what people inside the circle worry about.** They will strongly bind their identity to this cultural center, hoping to get a sense of identity and not wanting to become "mainstream" without any barriers. In the so-called high classic cultural and commercial districts interviewed by the author , the vast majority of respondents mentioned this demand in a protective attitude, and they rejected outsiders. The Shanghai aborigines said, "I don't want to stay in a relaxing corner that with tourists from other cities", and the old professor live in the nearby neighborhood said, "No need to let grandmas come to dance on the square with loud music " (Heishi Apartment, Wukang Road Historical and Cultural District, Fenyang Road Historical and Cultural District Street Follow-up, a total of 6 people)

It is both a driving force and an invisible risk. In the design solution, **it is necessary to find a balance point for the different and even contradictory psychological demands of various circles.**

## 1.4 Driver and Resistance of Symphony among Chinese

The phenomenon about circle exclusiveness we mentioned, can be seen in many specific cultural circles in China, especially symphony, a genre of music that belongs to a niche audience in the general audience. About 0.6% of people in China do not reject the classical music to which symphony belongs（NetEase Cloud Music, 2018）.

**The driver**

What is promising for symphony in China that the penetration rate of classical music in the country is increasing day by day, and the situation is promising. Meanwhile, the middle-class and new-middle-class people continue to account for the increasing proportion of the Chinese population, bringing greater momentum to the popularization of classical music. National Grand Theater ticket revenue accounted for 50% as early as 2014, and concert performances in second- and third-tier cities are also growing rapidly. In addition to the audience base supported by the original middle-class population, children and adolescents are increasingly becoming the main consumption scene through training

**The resistance**

However, the lack of channels to understand classical music and the high cost of listening hindered his dissemination. Mainstream digital music platforms, websites of symphony orchestras at home and abroad, and online music forums are the most important means of communication. (NetEase Cloud Music, 2018) Besides, the classical music content structure of the domestic digital music platform is fragmented, and professional orchestras and forums can only reach the core fans, and the public is more difficult to accept this type of music. Up a layer. At the same time, the high cost of live performances also hindered his development.

The characteristics of classical music also limited its spread. The characteristic of this type of music is that the content of the work is not rich. The interpretation and recording version are the content of another set of logic that fans continue to enrich. Only users who have a certain understanding of classical music and are willing to continue to explore will have the latter. Listening and downloading needs. For the vast majority of listeners who are willing or do not reject this kind of music, "music must be heard" is enough. Before understanding its basic knowledge and basic understanding ability, "monotonous content" may make people feel that Boring, then stop the desire to explore and continue to understand . (NetEase Cloud Music, 2018, and stakeholder interview)

## 2. Digitalization as a Trend for Traditional Museums

## 2.1 Objectives of digital museums to follow

### 2.1.1 Inheriting the traditional museum's objectives

In addition to the need to optimize the effectiveness of information delivery, the museum community has emphasized the need to place greater emphasis on the public experience. In 283 B.C., the Egyptian Museum of Alexandria Port was founded with the aim of spreading civilization, becoming the first museum in the world. The royal patronage positioned it as a center for the dissemination of knowledge about ancient civilizations. By the end of the 19th century, the museum was better defined as an educational institution with far-reaching and far-reaching social functions (Neil MacGregor, 2012). The modern museum is more fleshed out in its OBJECTIVE, which is defined as a non-profit organization that is both learning, educational and recreational, open to the public and providing services for the development of society (Icom 2007). Researchers in the museum community today continue this ambitious goal while suggesting the need to provide a more inclusive environment that engages the public in lifelong learning (E Hooper Greenhill, 2000).In 2018, Wiastuti, Adiati, and Lestari further clarify that museums should adhere to the concept of accessibility (Rachel Dyah Wiastuti, Nurul Sukma Lestari, Ika Triana, 2020). Throughout the development of museums, we can see that "education" has always been the core value of museums on the receiving side, and in recent decades, "people" as the receiving side has been increasingly emphasized.

### 2.1.2 Unique objectives of digital museum

The concept of digital museum has existed for more than 20 years. in 2017, it was defined by Ole Hylland as a museum that uses digital technology and the internet (Ole Marius Hylland, 2017). In his research, Liu Hongjiang proposed that digital museums are a class of online museums presented with the help of digital models, which are the product of the transformation of real environments to virtual ones (Hongjiang Liu, 2020). Since the Internet first appeared in the U.S. Army's ARPA (Defense Research Projects) agreement in 1969, the goal of military connectivity has been to create a decentralized federation (Wikipedia, Internet). As the Internet became civilian and permeated the museum industry, it gave it great power. To this era, this feature will continue to play a role in better information exchange. Nowadays, with the development of capabilities such as information transfer, digital modeling, and machine learning, the vision of the museum is to form a civilizational network that allows culture to reach every corner of the world across physical space. Its three main features are computer technology as the primary medium, accessibility, and high interactivity for visitors. More people can access, anytime, anywhere, and enjoy higher communicability.
The digitization of storage, network capabilities and sharing of resources are unique features of digital museums compared to traditional museums (Mingquan Zhou, Guohua Geng, Zhongke Wu, 2012). Google Arts and Culture once said,

*"Few people can be lucky enough to visit every art museum or see every one they're interested in, but now more people can enjoy more than 40,000 works of art from sculpture to architecture and painting all in one place. This is the progress that the museum field has made in the direction of Expanding Audiences" through the medium itself.“*

Digital museums help break down spatial constraints. Some virtual museums have made good use of the Internet to give the public access to digital backups of some exhibits with the help of the Internet, which has greatly increased the accessibility of information and effectively enhanced the value of the museum itself and the information conveyed by its exhibits. Korff Gottfried (2005) points out that digital information related to physical objects is as important as the physical objects themselves, and that they both have the right to exist and value. Bolenz Eckhard, Franken Lina, and others (2015) in Die Virtualisierung des Museums und Seine Objecten present their view that digital representations of objects can effectively solve the problem of information distribution. Even if the physical parent of an object is limited to a single location, we can replicate its digital doppelganger without losing any valuable information according to certain quality requirements, and eventually distribute it to various storage and physical locations as specified.
This has prompted this project to reflect on **whether we can adopt the same concept of museum design to reshape the current viewing experience of the Shanghai Symphony Museum, using other media to distribute information more effectively and thus take it out of its current predicament.**

### 2.1.3 Interactive accessor as value proposition for museums

Initially, digital museums were digital collections of online exhibitions designed to expand the museum's audience during special times or special events, such as Digitalt Museum in Norway. Lately, digital museums began to focus on improving the viewing experience and increasing audience engagement. For example, Arts Te Papa added a Spotify playlist as background music to its 2014 online art exhibition, making it more interesting. The Walters Art Museum in Baltimore not only allows exhibits to reach viewers around the world via the Internet, but also allows viewers to recreate and upload them as artists.
For 2019, Karaylanoglu proposes a more specific goal for the digitization of art museums:to become a process of interpretation to visitors. Karaylanoglu believes that the ability to make art museums more inclusive with the help of digital technology will be an important milestone transformation for the art museum industry. Between 2019 and 2020, there were a wealth of research defining what constitutes a good digital museum experience. in a comprehensive literature review published in 2020, Ghani defines four important indicators of the digital museum user experience experience: effectiveness, efficiency, satisfaction, and appeal. In addition, a large number of other researchers have explored the digital museum experience during the last two years (Qiong Dang, Katia Segers, 2019; Marco Mason, 2020; Rachel Dyah Wiastuti, Nurul Lestari, Ika Triana, 2020). Their conclusions share a common keyword: accessibility or inclusiveness.  Reached broad consensus in these researches , **the ability to effectively reach a broader public was the core experiential value of digital museum**.
The social value and objective of museums has also been gradually enriched and even reshaped by the emergence of digital museums. For example, in 2021, Kist and Tran just published a paper that explores the coexistence of traditional and digital museums from the perspective of museum staff and how to provide a more continous experience for visitors. The Baidu Digital Museum defines itself as:

*“the age of the Internet of Things that connects the vectors of human civilization”*.

The general trend of digital museums is the development of better information dissemination, making culture and civilization more accessible: anyone/anywhere/anytime, online and offline will not be strictly distinguished.

## 2.2 Tools for traditional museums going digitalization

**Constructing knowledge system for educational goal**

At the beginning of the period, the logic of scholars' research was based on the borrowing of educational institutions and their innovation in teaching contents , analogous exhibitions, and educational methods, analogous exhibition arrangements. As early as the 2000s, the concept of "education" has been deepened and expanded, and a broad consensus has been formed. Teaching is not limited to formal institutions, but takes place in countless informal places in life, and the formal educational process is only a small part of learning. This concept is a very accurate prediction and identification of the concept of digital copies in the digital age (Eilean Hooper-Greenhill, 2000). The meaning is for museum visitors to use any skills and knowledge they may have from their own perspective, based on conditional needs, and in response to the experiences offered by the museum. Digital technology in the museum environment is designed to provide immersive context (Mistuhiko Yamazaki, Kazuhiro Kasada, Oribe Hayashi, 2010).

**Tagging the physical knowledge graph into digital**

Information in traditional museums for digital applications needs to be labeled, and the adaptiveness of the labeling system determines the sustainability and replicability of the whole system. Past researchers, in an effort to make digital information more inclusive and pervasive, have studied social tagging patterns in two languages in comparative art image collections, while seeking the advantages of applying multilingual social tagging available in digital libraries and museums (Irene Eleta, Jennifer Golbeck, 2012).  Art museum website supports tag-based search and user tagging of artworks - an effort to explore how users access artworks while interacting with the museum's online search and retrieval system (Malika Mahoui, Kyle Jaebker, 2013).

**Digital technology goes offline**

Jushchyshyn and King (2019) utilize the cutting-edge technology of VR to bring the highest quality apparel virtual experience to the widest and most inclusive audience. In the virtual environment, there is a possibility for the audience to interact with the exhibits. The study of this technology leads to the conclusion that the creation of mobile media digital museums has brought benefits to people's lives, allowing them to visit museums and learn relevant historical information from the comfort of their homes. (Window Liu, 2021). In recent years, refreshing experience without physical relics, such like the Raffiello Opera Omnia supported by naked-eye 3D counting and the multimedia version of "Qingming Riverside" by the National Palace of Arts of China, have been gradually adopted by offline museums.

By this far, the exploration of the technology itself has largely ended in large-scale exploration and experimentation, and the current step and tasks in the near future is to use theses technology to enhance the effectiveness of cultural communication and create more value for the museum industry. In a newly published study, Vassiliki, Maria and Fotis (2021) define industrial value empowerment as a strategic digital transformation of museums.

## 2.3 Gaps of digital museum solutions to fill

The existing digital museums can be roughly divided into three categories according to their digital objects:
1) [Objects: offline exhibition experience] The digital backup of a front-line museum can be reproduced. Visitors can visit online to simulate the realistic experience of offline visit, such as the digital exhibition halls of the National Museum of China and the British Museum. The system supports immersive mapping, HD supports viewing detail, knowledge map and digital copy library supports indoor tour. 2) [Object: Exhibits: Collect a large number of exhibits, so that exhibits in different preservation states (the original works are no longer or cannot be actually felt) and locations can be accessed in a digital space, reaching a breadth that physical museums cannot achieve, such as Norway Digitalt Museum, Baidu Digital Museum. It greatly expands the flow of people and the capacity of exhibits in the museum, and exhibits can be presented to the audience at the same time, breaking the space and time limitation. 3) [Object: Information] Use new technologies such as AR, VR, digital twin modeling etc. to reshape the exhibits, reshape the sensory impact that is difficult to obtain directly from the original exhibits, and have a deeper understanding of the exhibits, such as Shanghai Science and Technology Museum, digital exhibition Raffaello Opera Omnia, Multimedia version of Qingming Riverside. Visitors are able to interact with exhibits, realistic restoration
Looking back at the developement of digital museums, a gap in between is obvious, which is the **majority of digital museums focus on visual-based museum solutions**. In these museums, "sound" is more of one of the multi-channel tools used to assist the understanding of visual exhibits, and is not the main theme of the exhibition and the main content to communicate with the visitors. The type of Shanghai Symphony Museum is a sound-based museum, which conveys information including both the knowledge related to music history and the music itself.
In the procedure of cognitive information processing, vision always plays a dominant role , and auditory information is used to assist information acquisition, which is jointly determined by the development maturity of brain regions, the information processing speed of the brain for the two kinds of signals, and the information storage capacity (Ulric Neisser, 1967). Due to the differences between Auditory and Vision information, it remains to be verified if sound-themed museums with both auditory and visual information will reach same level of effect on experience enhancing as the visual exhibits does. Therefore, in the wave of museum digitalization, **a solution is to be explored for the digitalization of museums with auditory and related information theme**: it will ensure the effective transmission of the main exhibition information, while enhancing the visiting pleasure, and succeed the critical objective of accessibility for the museum.

## 3. Reference to Reshape the Expeirence of SSM

## 3.1 To expend the social impact as a community museum

There are brilliant community museum that has successfully broken the wall for public to the museums. Here I study 3 out of them as typical cases to study about the must-be and trend of bring a museum into community.

**Exploratorium, outdoor installation that integrate with the environment**

The Exploratorium in San Francisco has played a key role in the history of science and technology museums. Founded in 1969 by Frank Oppenheimer (1912-1985), the brother of the famed nuclear physicist Robert Oppenheimer (1904-1967), the museum celebrates a full range of interactive experiences, Create a new model of science and technology museum. Frank has adopted the concept of a "science lab library" that allows students to follow their curiosity and create discovery libraries to explore scientific phenomena at their own pace, using devices that work closely with the environment. He also believes that visitors can learn about natural phenomena in their explorations and have confidence in their ability to understand the world around them.

Figure 3.1 Visitors are exploring outdoor installations of Exploratorium

**Oakland Museum of California, co-create a community cultural center with citizen**

The Oakland Museum of California and the Exploratorium were established in the same year in 1969. The Art, History, and Natural Sciences of California together compose the theme of the Museum. Because the museum has been insisting on "Makes Oakland a More Equitable and Caring City", she is considered as a "museum of the people" by local residents. It creates a new mode of symbiosis between the community and the museum. Through rich community activities, it creates close contact with residents, becomes a public forum, and thoroughly integrates into the local community life.

Figure 3.2 Citizen is used to hold cultural related activities in OMCA

**Kirkleatham Museum, inclusive museums for everyone to visit**
The Kirklissom Museum is the local heritage museum of the Borough of Redcar and Cleveland. Themes range from local industry to Marine and social history. There is also an annual Theme Temporary Exhibition, family events, musical performances and seasonal events. It has been awarded numerous awards in the museum world, including the Stanford Education Award, for being highly inclusive of the entire population, highly interactive and user-friendly in its facilities, museums changes live by Museum Association and so on.

Figure 3.3 Public at divers age and backgrounds are enjoying Kirkleatham Museum


To design the community museum, the pioneers always keep the educational and entertaining as initial objectives in mind. **And in these community museums we could see that accompany or relationship plays an important role other than exhibition itself.** Only if the visitor feel part of it, would they invest attention to the information proactively. we can see from these museums different from the traditional ones, are that they transform from showing to experiencing, and inside these museums, more flexible of information and form to communicate to respond different segments needs. The most charming character of the community museums are that they play a role in the local life, bringing cultural and economic value to the community, besides, they broke the wall of museum, went into daily life and living community proactively. So Beyond the four wall and exhibits, culture and relationship is the more precious. Within this space that the museum creates, everyone can exhibit (like TED), practitioner can bring their new masterpiece, eventually reach the objective that information and culture is anywhere, anytime, fragmentation.

### 3.2 To empower the museum with relationship, physically and mentally

Community design is a design field that has appeared since the 1960s. The original intention was to pay attention to the relationship between people in the construction of new towns, and the relationship between people and space, and people and people in public spaces. **Inspired by this concept, I supposed to build relationships during the visiting experience would bring much engagement to the visitor and value to the community that the museum locates in.**
Community design is a field of design that began to appear in the 1960s . It was originally focused on the relationship between people in the construction of new towns, as well as the relationship between people and space and people in public space. Now it is gradually recognized by more and more people as **community empowerment.** The functionality of the design can be well reflected in community design application cases, such as Kajima Community Revitalization in Japan with the help of people and good working relationship with the local ecosystem, social interaction to revitalize the community economy, and Sato and transformation in Tokyo Fuji kindergarten to let every child in the same year can roam in the boundaryless kindergarten. The social value and economic benefits of these visualizations endow the design with productivity and vitality.
The core of the community empowerment concept is to focus on people. This concept is explained by Ryo Yamazaki as "the link between people". In this thesis, I plan to help people to establish a temporary relationship between people in the future system, the establishment and maintenance of this relationship is conducive to achieving the purpose of symphony communication. Of course, as users of the system, people have full freedom to choose whether to be an island or to connect with others.

Figure 3.4 Get local residents onboard

Figure 3.5 Visitors participate local festivals

Figure 3.6 Local children as city guide

KAJIMA COMMUNITY

Although the final choice may only be one of tens of thousands of possible species, a Human-oriented system should provide users with free space to do choice, which can be further interpretated as the **inclusiveness of a community**. In this design, another key issue is to improve its tolerance. Music and museums are cultural content and activities with social value for public welfare. Their charm should not be limited by avoidable "barriers" (including information channels, cognitive level, knowledge reserves, social media use, and space). As a member of the city, every member of the public also has the right to enjoy social welfare. The influence and humanistic charm of the museum itself and the community in which it is located has the opportunity to fully ferment by reaching a wider public. For designers, letting everyone enjoy a better life more decently is more of a social responsibility.

**As the first step to break the barriers, I chose to break the space restrictions as the starting point, so that the information in the museum can flow freely.** Starting from the Shanghai Symphony Music Museum, it extends to Donghu Park at the intersection of Huaihai Middle Road and Fenyang Road, covering the area surrounded by the four historical and cultural streets of Baoqing Road, Fuxing Middle Road, Huaihai Road and Fenyang Road, passing by the Shanghai Conservatory of Music ( Fenyang Campus), Shanghai Symphony Orchestra, Clemens Apartment, Donghu Hotel and other important cultural/historical places. If there is a block that may represent Chinese symphonic music culture, this area is one of the best choices.

Figure 3.7 Locating district for Flow Museum of Symphony (1st edition)


**Specialty**- The intersection of modernity and history (the most prosperous commercial district of Shanghai, Middle Huaihai Road, and the concession area of Shanghai a hundred years ago), the imprint left by the flow of time can be seen by the naked eye, which is the witness and best practice of a period of history of Shanghai and even China.

**Importance**- The most influential neighborhood of Chinese symphony music (one of the most influential symphony orchestras in China and one of the highest music institutions in China is located here), where important performances, musicians and students come and go in an endless stream.

**Humanistic potentiality**- Moreover, more importantly, this community offers a glimpse of the diversity of life in Shanghai. Elegant music, indigenous people, famous tourists, various-cultural backgrounds, and various industries play their own roles in this area, making it full of "The vitality.
However, the exclusivity of the cultural circle mentioned above and the lack of inclusiveness of public facilities found through field research also expose the fixed group of people who enjoy services in this region, only those in the music industry or those with more consumption power. While the day is still bustling, at night few passers-by can only walk in the dark. From the inclusiveness point of view, there is much to improve in this highlighted region.
For this region, if it is expected to establish a strong connection with symphony in the public cognition, it is more appropriate to give it an irreplaceable identity as a cultural center to **Promote the development of the music industry and Enhance the humanistic quality of citizens**. What kind of system can bear such a mission, and how to measure whether a system really works, are the research hypothesis focusing on and the prototype of the product that in this thesis tried to build gradually through dialogue, collision and finally with multiple stakeholders and the public.

### 3.3 To improve public's comprehension of art with synesthesia

By making full use of synesthesia, digital cultural products are empowering art and traditional culture in an elegant way. So I choose two classic digital products to case study.

**Tate Ball**

Tate Ball is an App that helps the general public learn more about works of art. It takes environmental conditions and user activities as input information. As long as the Magic Ball in the user's shake mobile phone, you can get a famous painting that best matches the current one. Visual analogies also as context, make the rules of interaction easy for anyone to follow.

The APP makes good use of the correlation between the information of the two worlds, so as to help users quickly establish emotional resonance with famous paintings. What is more inspiring is that the high degree of automation of information input also increases the degree of surprise in the process. The machine learning process catch the information of weather/location/background visual information/ambient noise/body gesture as input, classify and predict with the artwork with the highest percentage of correction.

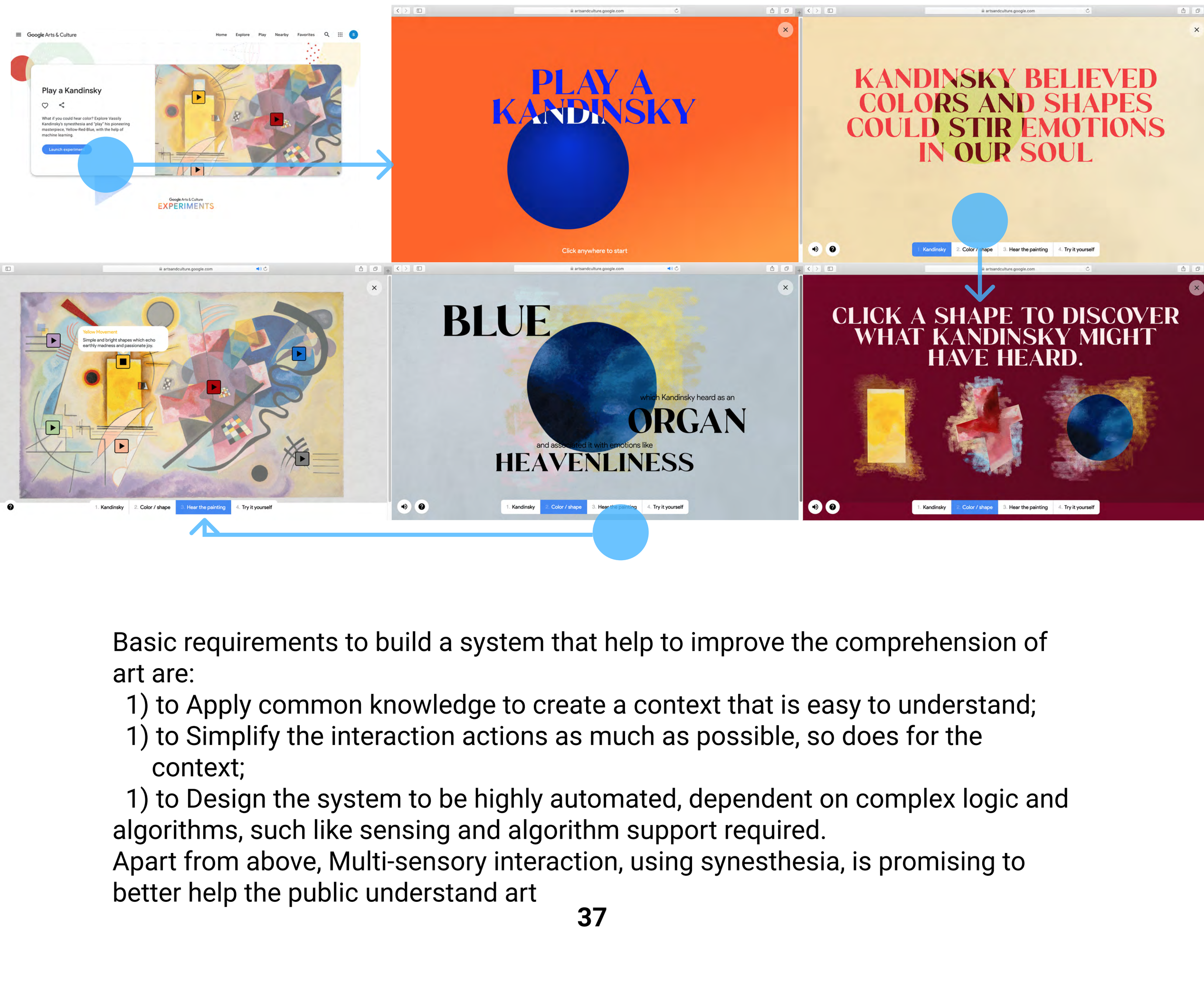
Figure 3.8 The use case of Tate Ball

**Google Art & Culture: Play a Kandinsky**

Google Art & Culture is always committed to bringing art and culture to the public with the assistance and power of technology. Play a Kandinsky is an online game that connects a symphony to the work of the famous painter and pioneer of abstract art, Vasily Kandinsky.

By the feature "playing your own music", a user will be effectively able to establish a relationship between the visual and auditory art, which is both entertaining and understandable. The establishment of interaction rules is the most important element for its onboarding step before the playing with a Kandinsky, and it is also the process of establishing a cognitive system for both the basic elements in abstract art and components for music

Figure 3.9 The use case of Play a Kandinsky




Basic requirements to build a system that help to improve the comprehension of art are:

1) to Apply common knowledge to create a context that is easy to understand;
1) to Simplify the interaction actions as much as possible, so does for the context;
1) to Design the system to be highly automated, dependent on complex logic and algorithms, such like sensing and algorithm support required.

Apart from above, Multi-sensory interaction, using synesthesia, is promising to better help the public understand art

### 3.4 To engage visitor with digital art and narrative story

Digital interactive art is a medium that combines technology and art to allow people to interact with the environment and other people. First time appeared in the 1960s, since Myron Krueger build the first interactive space Glowflow(Söke Dinkla, 1994) , its significance is to carry the public education and help the public better understand art itself, rather than distract the audience's attention just because of "fun" but lose the purpose of conveying the artistic message itself. Inherited the essence of this art, its shape is gradually being improved, the trend is: people from participating in the role of the leadership, interaction from strong regularity to freedom, from single to compound feedback form, feedback from the representational content (such as on or off) to the more stereo, from predictable to increased serendipity (variable increase to make rules more complicated, unpredictability, playability and stronger).

Figure 3.10 Very nervous system

Krueger, 1991

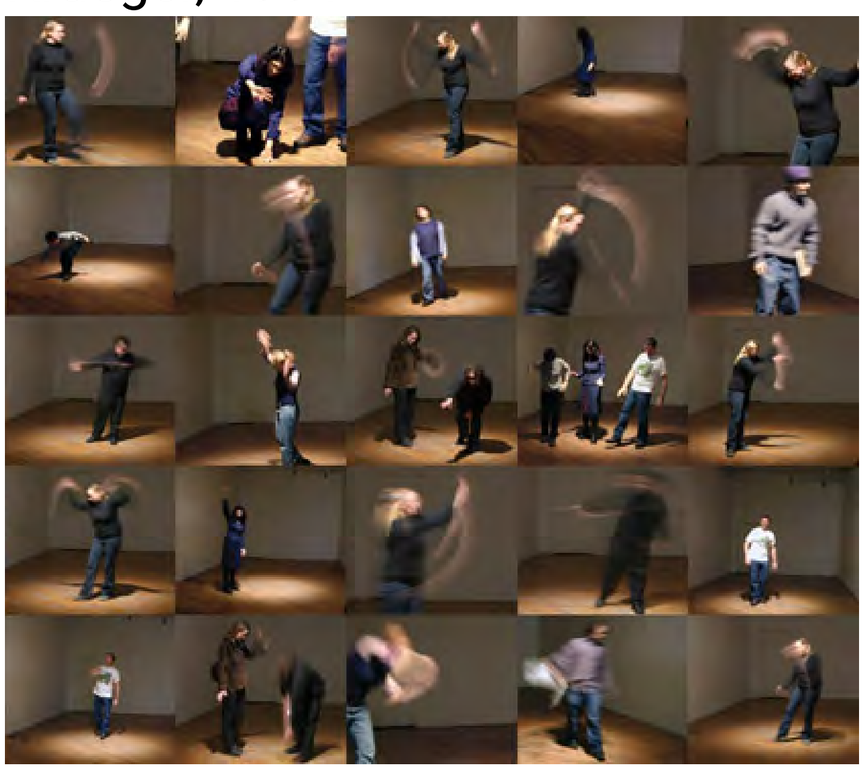
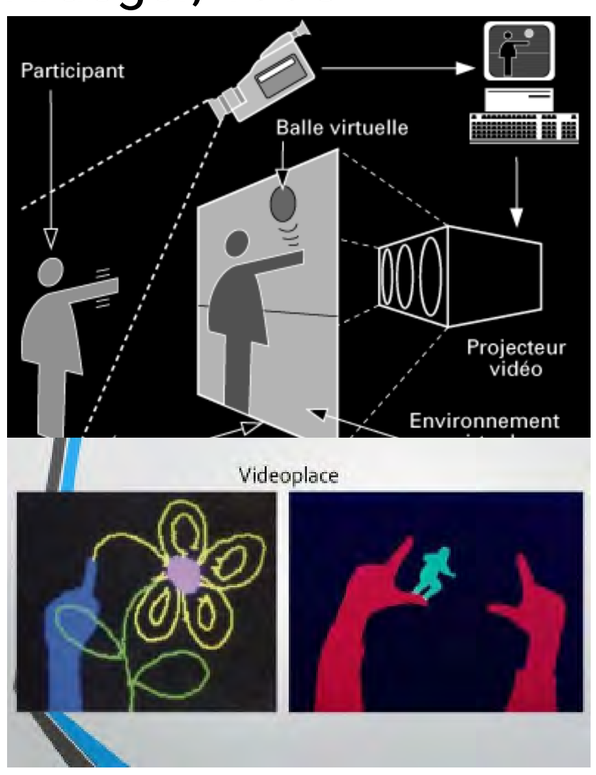


Figure 3.11 Videoplace

Krueger, 1998




For more effective and natural involvement of the audience, narration is dedicated to be through all along the experience as the interaction principles, and usually this is a familiar story for majority of the audience, or accepted rules popular in the whole society or a specific circle (Schweibenz Werner, 2008). This approach allows the audience to initiate an interaction at the lowest cognitive and learning cost, and to anticipate and execute the next action effortlessly and naturally.

The narrative principle is also used in many digital user interfaces today to ensure a higher level of user involvement, to ensure that users can quickly learn how to use the product, and to greatly improve the usability of the product or system (Don Norman, 2002).

In this thesis, I will **need to define a suitable Narration metaphor**, to make the system for different levels of knowledge of people have fun, and to make sure everyone in the diversity of population can better into the interaction with the system, at the same time in the interactive process to establish a more comprehensive cognition of the principles, so as to build up corresponding knowledge system.

## 3.5 To narrate with basic knowledge of symphony

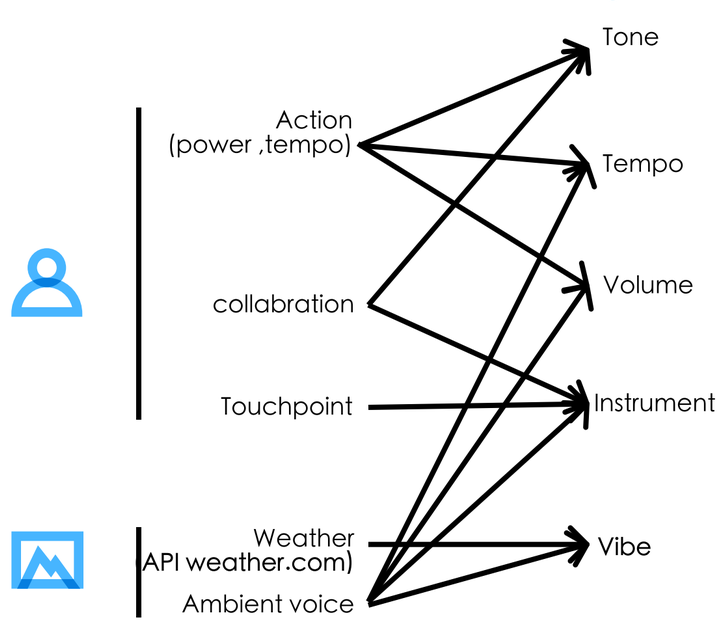
As mentioned above, I expect that the Common sense in the field of symphony music, the content subject of this system, will serve as the core interaction principles of the system and also serve as the relevant knowledge system directly established by this work for the public. Through sorting out the original information structure of the symphony music museum, the information range suitable for the public transmission is locked. **The information to communicate is supposed to have the following three characteristics: basic, easy to learn and systematic**. To design the infromation architecture and frame of interaction, it is necessary to ensure that all knowledge is systematic, and the learning difficulty gradually increases from basic knowledge to advanced knowledge.

**Definition of Input**
For the Information Architecture, four domains will need to be included as base, which are

1) Basic information of works
2) Types and characteristics of Musical Instruments
3) Arrangement rules of symphony orchestra
4) schools and tonal colors of symphony orchestra.

If the audience has some basic knowledge of music at the same time, such as music form, mode, theme change, orchestra seating, tonal color contrast and so on, then they can get richer knowledge and enjoyment.
The four elements of the basic composition of music include the pitch, the length of the pitch, the strength of the pitch and the timbre (Chongguan Li, 1980). These basic elements are combined to form the common "form elements" of music, such as rhythm, strength, mode, etc. Each musical work has its own combination of form elements, so it can be matched to the corresponding work through specific elements. In this work, both user actions and surrounding states will be employed as input, which will be translated into the basic elements of music correspondently. The frame of interaction is designed based on the coding pattern below:

Figure 3.12 Coding between user action, surrounding states and Music



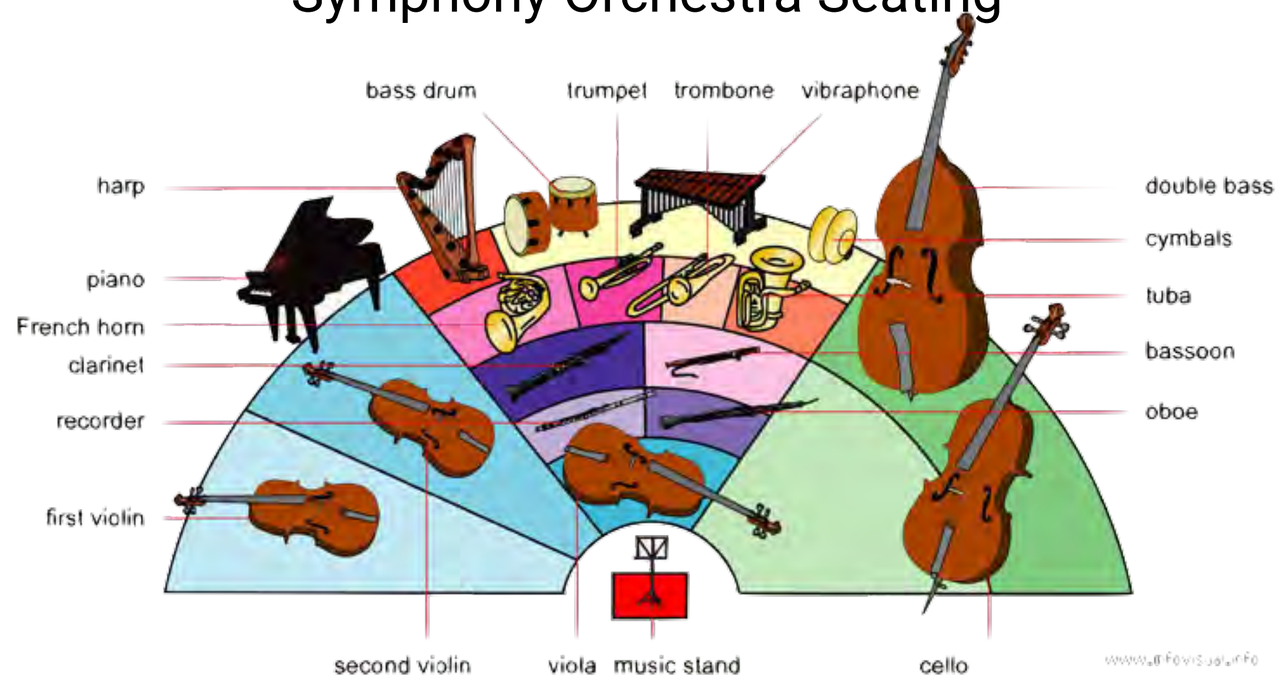
**The Metaphor**

The orchestral arrangement of a symphony orchestra generally consists of five types of instruments (BBC Symphony Orchestra Discover) :

1) String instrument group with concertina prima concerto group;
2) Woodwind instrument group;
3) Brass instrument group;
4) Percussion instrument group;
5) Color instrument group.

Using the seating of a symphony orchestra as a metaphor, this study helps users to establish a basic understanding of "seating and arrangement" of a classic symphony piece.

Figure 3.13 Interaction metaphor



**Definition of output**

There is a type of symphony called “Symphonic poem” or “Symphony great, to describe the nature and life scenery as the main content (Wikipedia, Symphonic Poem), relatively easy to understand . The has been studies about Musical Conceptual Blendings for better music spatial expeirence. Russian composer Mossorgsky's "Pictures in the Exhibition" (Costas Tsougras, Danae Stefanou, 2018) and the German great composer Beethoven's "Pastoral Symphony" can be said to be of this kind of works.

Reversly, in the visual art world, Kandinsky started "composition painting" and "improvisation painting" around 1909, called "symphonic composition" paintings. If the classical works can be better understood by more people with the help of the logic of "symphonic composition painting", then the compreshension of the tonality and color contrast of the works is promising to be solved.

So to verify this hypothesis, this work will take environmental state as input and visual art works as output to assist users in understanding "theme and tonal color" of a symphony work. By the end of the work, there would be a conclusion after user tests.

Figure 3.14 Sketch for Composition V by Wassily Kandinsky

Figure 3.15 Sketch for Composition VIII by Wassily Kandinsky

# 4. Design Hypotheses

# Flow Museum of Symphony

A new form of sound-based digital museum into community: the Flow Museum. The research section will revolve around the following hypotheses

**Value Enhancement of the museum**

1) The establishment of a unique cultural image can enhance the humanistic charm of the community in the public's mind;

2) Humanistic charm helps to enhance the visibility and social influence of communities and museums.

**Effectiveness of the interaction**

1) Information can be spread more effectively without the restriction of a fixed place;

2) Open community museums are more inclusive to the diverse public;

3) The basic knowledge of symphonic music can be built through entertainment;

4) Visual information will better help the public to interpretate the music;

5) The public of varied literacy levels are able to experience the joy and benefit of new knowledge;

6) It is easier to generate more public interest in the symphony through education and entertainment.

# 5. Research

## 5.1 Discover and Define

### 5.1.1 Sub-Hypothesis 1

Incomplete experience chain and lack of interactivity are the reasons why the Shanghai Symphony Museum has difficulty in increasing its influence, limited exhibition effect and insufficient viewing experience. There are potential design opportunities in the surrounding communities to improve the experience chain, and a more participatory game format will help enhance interactivity.

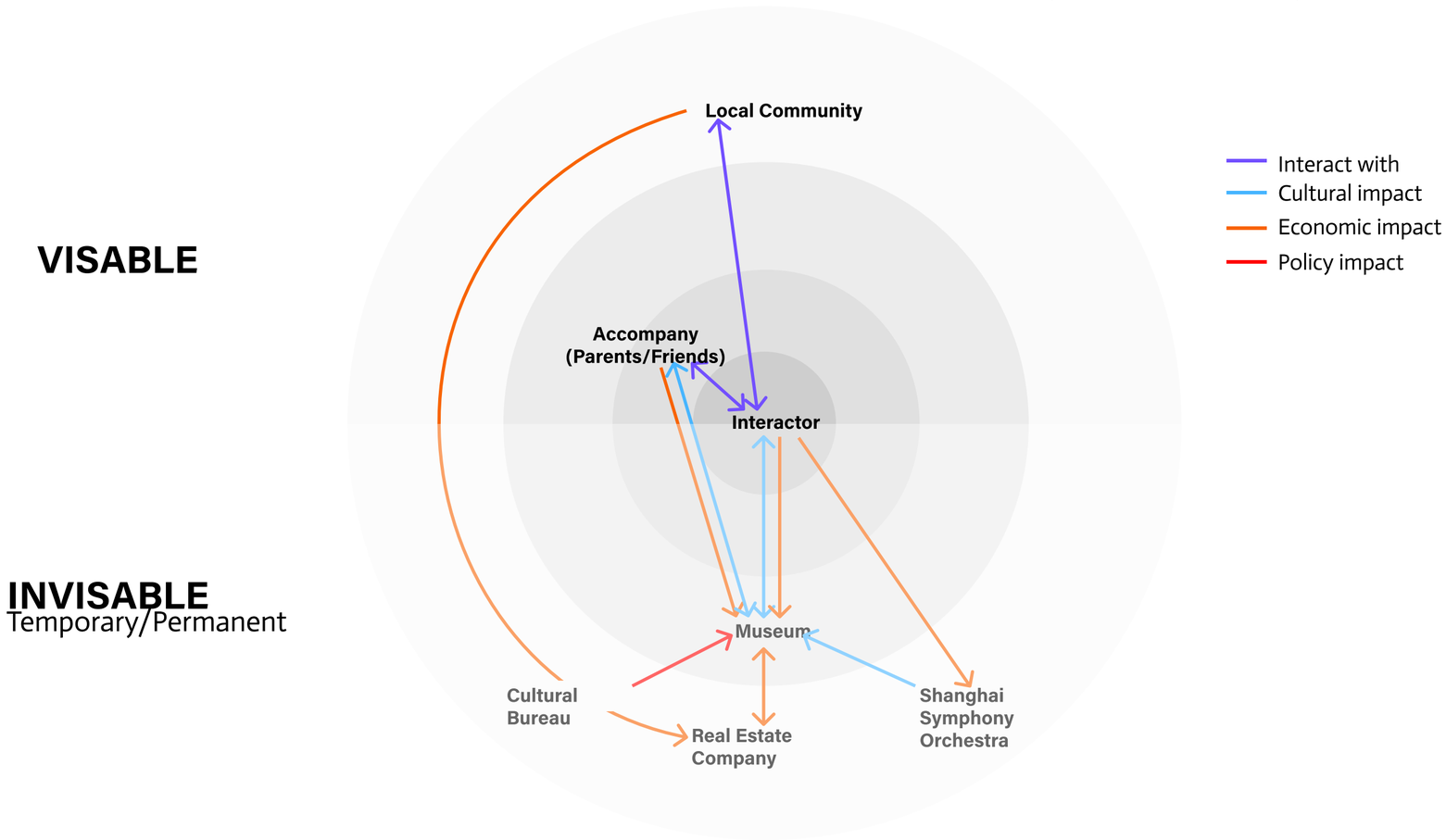
### 5.1.2 Executive plan

**step1** to understand the current state of operation through museum tours and stakeholder interviews;
**step2** to conduct audience shadowing and interviews based on the information obtained in step1 to sort out the experience journey and discover experience pain points;
**step3** to observe and record the movement trajectories of pedestrians and residents in the local community to discover potential design opportunities for integration with the Symphony Museum

### 5.1.3 Executive process & Results

**Tools：Museum Visit + Stakeholder Interviews**
After the interview at the museum director, we clarified the current stakeholders of Shanghai Symphony Museum and the relationship between them. The specific map is as follows.

Figure 5.1 Stakeholder map of SSM (1st edition)



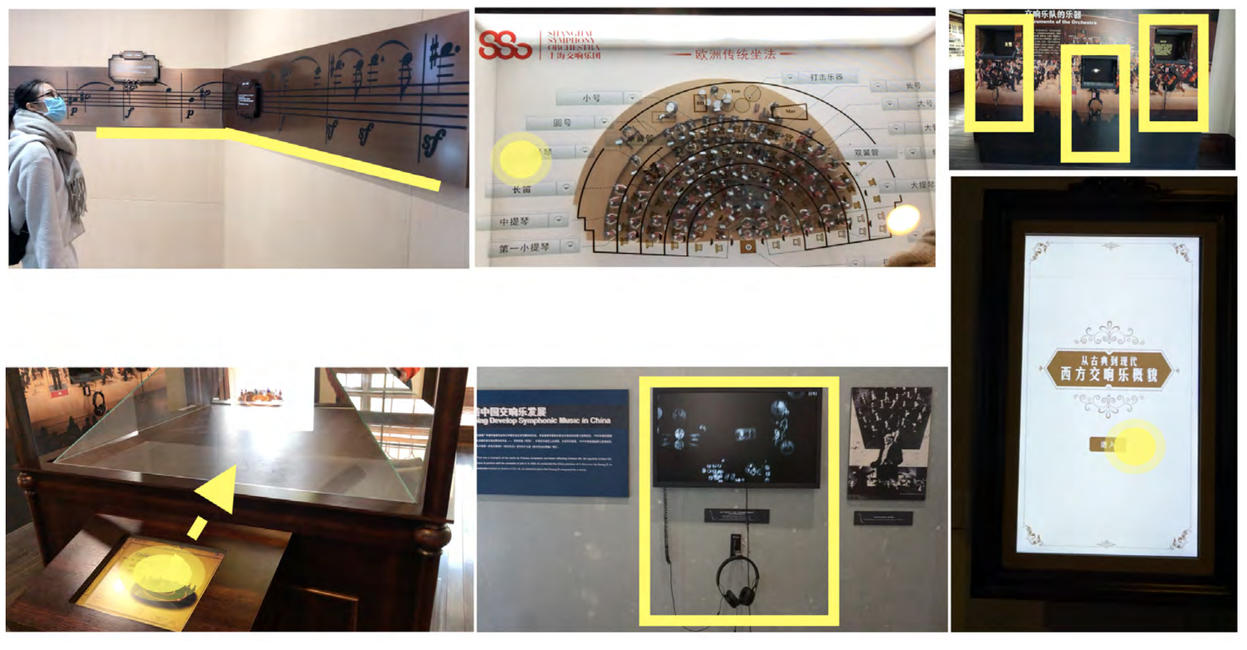

### 5.1.4 Result

**Painpoint of the museum**
The museum's current business pain points on three levels: lack of publicity measures and channels, almost no one knows there is a museum here; the museum site is not large as part of a historical building, so as not allow more people to visit; the exhibition installation interaction form single, can not effectively make the audience fully interactive.

Figure 5.2 Random visitors of SSM are blocked out for no avalability for that day


Always “0” available

Figure 5.3 Interactive principles inside SSM are simple but dull to interact with



**Painpoint of the visitor**

After the field observation experience, in addition to the above pain points, problems were also found about visitors not being able to understand music knowledge well. First, people who have never been exposed to symphonic music will not enter this museum because they do not know what symphonic music is to them or have never felt this kind of music. Second, visitors who lack a basic knowledge of orchestral music are not interested in the knowledge of orchestral music here, or are not able to learn and understand it well due to the limitations of the exhibition design. Finally, people with extensive knowledge of symphonic music will only receive information that they themselves are already familiar with, and it is likely that this museum will only be visited once and that is enough.

**Design Objective and Locating**

Here the context scenario is basically clear: to ensure the integrity of the visitor experience to take care of the experience before, during and after, so that the public can more easily accept the knowledge of the symphony, and different levels of audience can be satisfied. A detailed analysis can be found in Chapter 1.1.

The design will need to further explore possibilities that the museum would have if it served as a community museum.

I setteled the museum as a starting point and connected 3 nearby historical and cultural sites that were closely related to the symphony at the beginning, and tentatively locked in a scope that could be transformed into a community museum. A detailed description can be found in Chapter 3.2.

A week-long observation was conducted within this district. In order to minimize sampling bias, the observation time covered weekdays and weekends, sunny days and rainy days, daytime and nighttime, and mainly used video cameras and cell phones to take photos and observation log sheets to record pedestrian behavior.

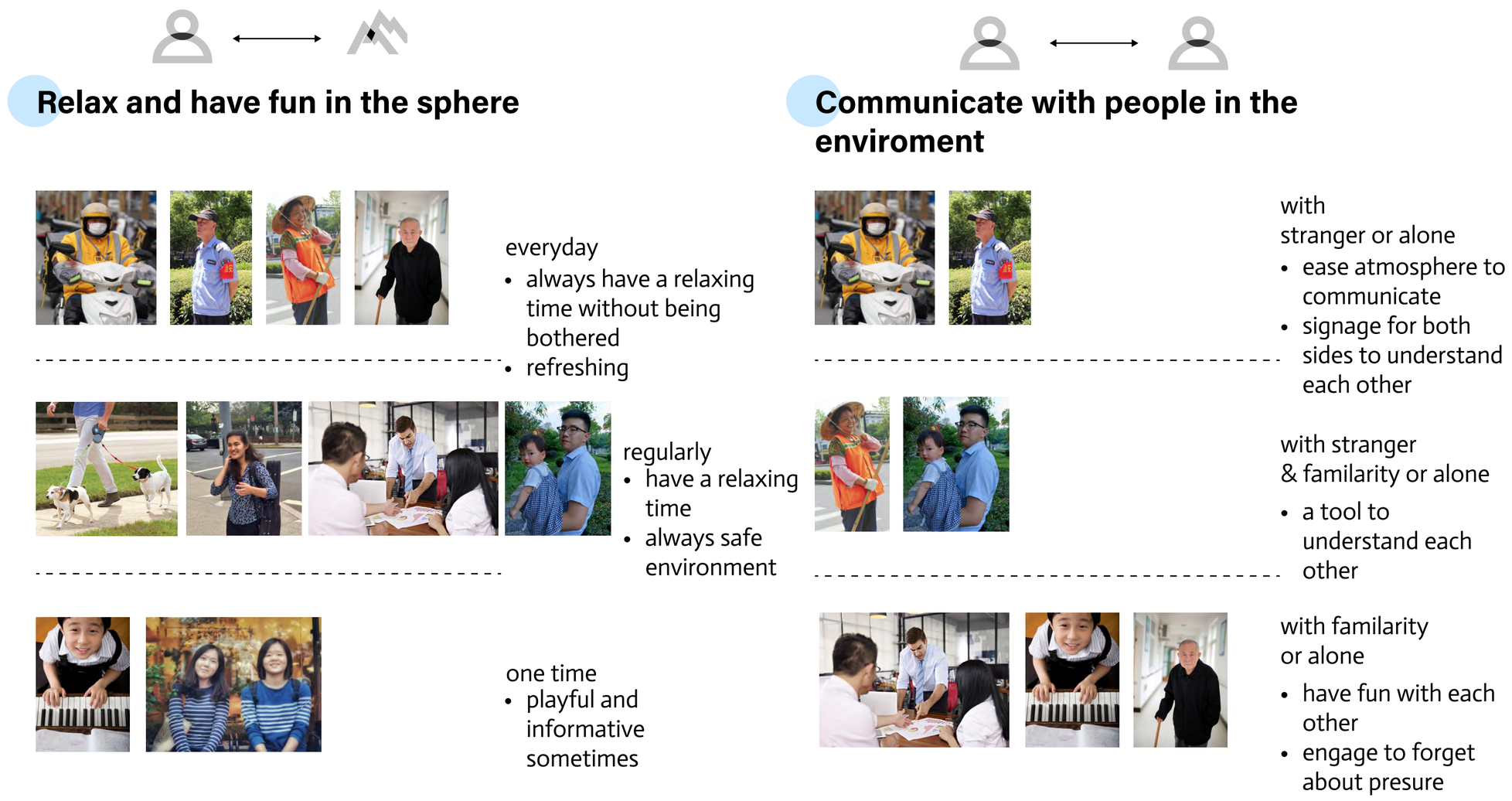
**Situational personas to further focus**

A total of 12 situational persona were generated. This persona records the behavioral characteristics of the universe of people in typical scenarios, and selects scenarios among these people that are likely to be integrated with the community museum, so that the action issuers become potential users and visitors of the museum in the local community.

Figure 5.4 Situational personas of visiting SSM in the selected district

They have different demands on the cultural activities they participate in in the community.

Figure 5.5 Matrix of the personas need in conditions




**From availability/willingness/scale/uniquness point of view, I focused on four targeted segments to start with**, who are young local parents with children who move around the community almost every day, security guards/cleaners/neighborhood office workers who often work in the neighborhood, students on their way to and from school periodically, and tourists on their way to the neighborhood on city walks.

1) For those visitors and neighbors who are in the neighborhood every day, always have a relaxing time without their daily life being bothered, but refreshing;

2) For parents who bring their children along, they need to have a relaxing time while always safe environment;

3) For occasional visitors and passersby, they need to be playful and informative sometimes;

4) For each group of people there are corresponding boundaries, and they are not going to go near the symphony museum in the scene at that time.

**I plan to fill the gap with charactors of community museum**, for it is in line with the selected target segments' desire for relationships and the desire to be deeply involved in community life.

**I will verify in the next phases**

why would they choose a museum installation, if they are to be able to reach the purpose of relaxation, entertainment and learning in the original living scenes? What features would this flow museum attract them to interact with it?

## 5.2 Converge and Ideate

### 5.2.1 Sub-Hypothesis 2

A game that fully interacts with its surroundings will attract the neighborhood's visitors and resident democracy to participate in it, and a cooperative form of the game will enhance playability while allowing fellow pedestrians to establish temporary relationships. The pleasure and context of participating in the above game will make the public more interested in the symphony.

### 5.2.2 Executive plan

**Step1** Moodboard to get design inspirations for attractive design which will calls for collabration and promote relationship.
**Step2** Locating and preliminary open community museum concept, the formation of business plans and generate concept story;
**Step3** respectively to the interests of the phase, expert, users to verify the feasibility and acceptance of the program;
**Step4** adjust the program and concept after refining the service process

### 5.2.3 Executive process

**Moodboard to get inspirations for the system**

**Keywords**: Collabration, relationship, systematic, simple, playful, physical and dititial

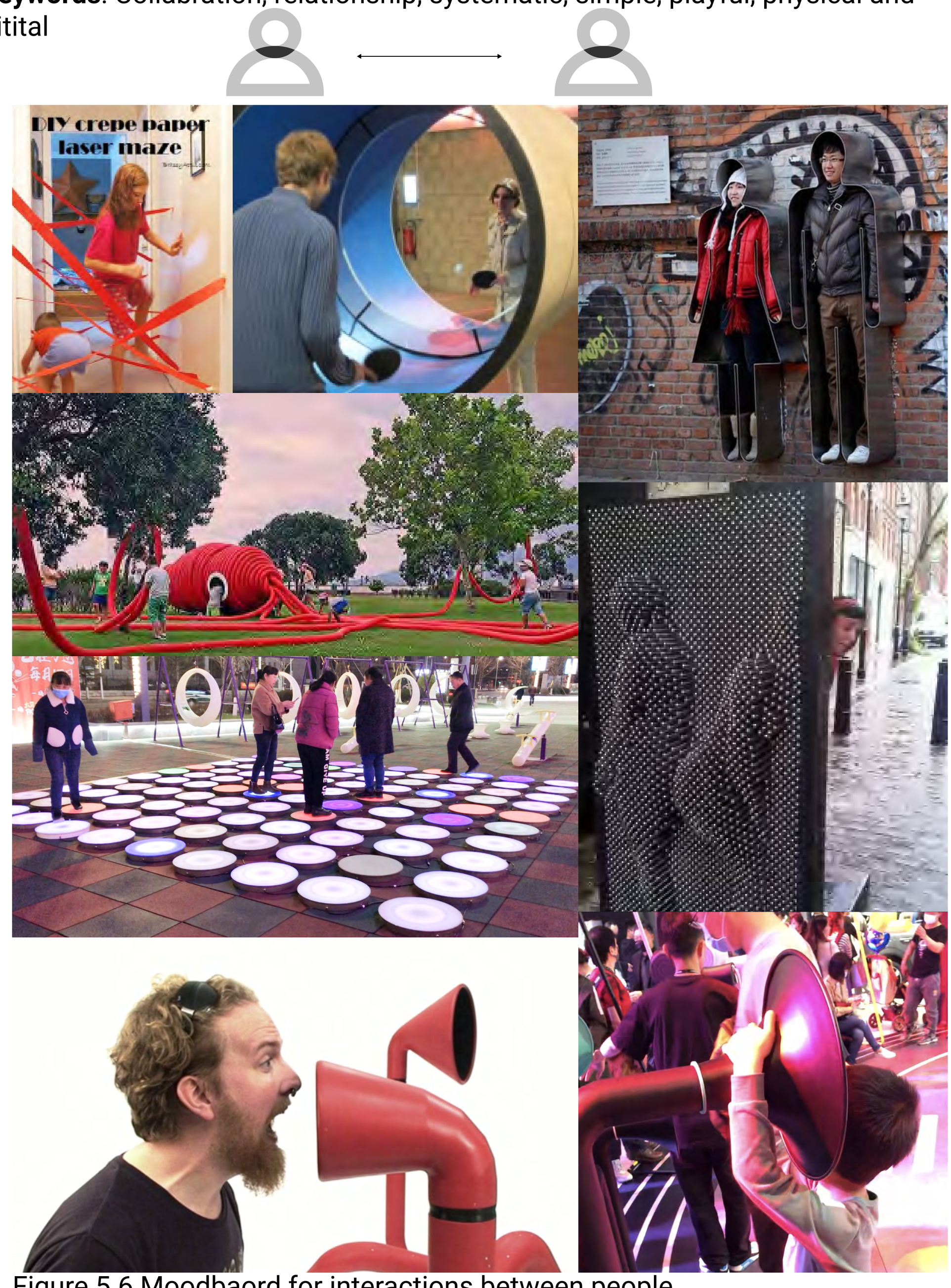



Figure 5.6 Moodbaord for interactions between people

**Keywords**: Immersive, co-create, responsive environment, free, exploration, suprising, learning, cognitive restructuring

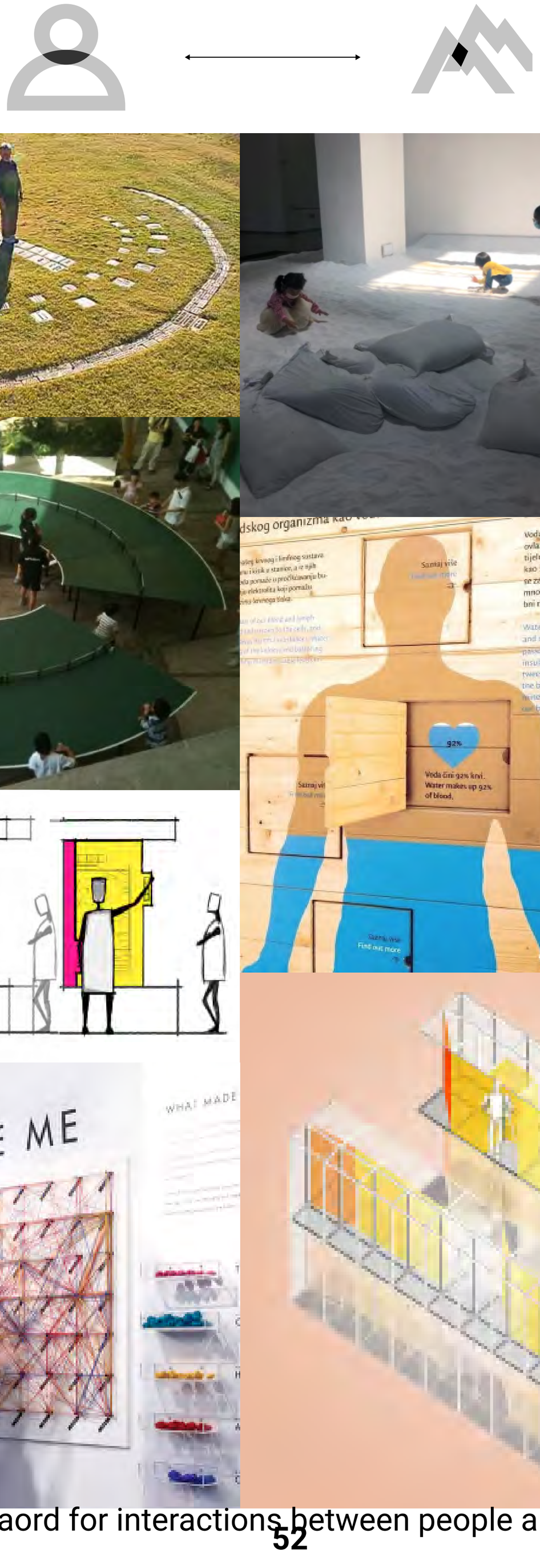


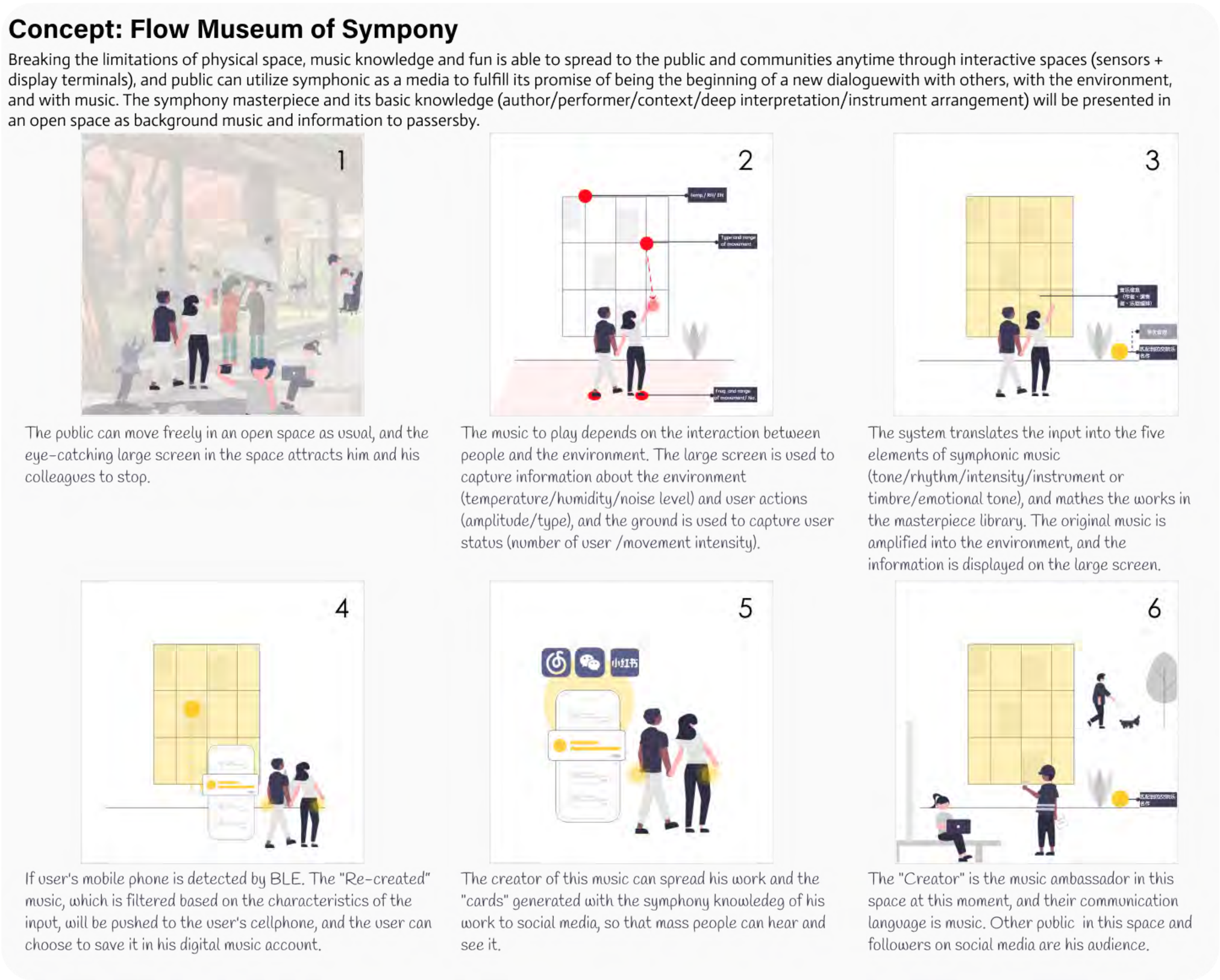

Figure 5.7 Moodbaord for interactions between people and surroundings

**Ideation into design concept**

In this phase, the solution went through 2 versions.

Version 1 - The target audience is the general public only, who perform the main interactive acts and obtain information on the terminal interactive device totem. As for the interaction frame, together with surrounding information, the tense and tempo of movement, and number of users to interact at one time, as well as on-air body gestures as input information to represent user's mood as input.

Figure 5.8 Concept storyboard (Verson 1)



# Flow Museum of Symphony

Figure 5.9 Business Plan (1st edition)


To prepare for the stakeholder validation test and user concept acceptability test, I created two piece of materials, which are the business and feasibility plan book for the concept for validation test, and the concept storyboard for concept acceptability test.

**Tool 1: Stakeholder validation test**

Interviewees: 5 in total. Including museum curator, NetEase Cloud Music product manager and vice president, music educator in Guangzhou Xinghai Conservatory of Music, real estate practitioner, and museum exhibition planner

**Tool 2: User concept acceptability test with Low-fi prototype**.
Random interview on the street with target group of public.
Interviewees: 9 in total, from 11y/o to 76 y/o, status as family/ couple/ friends/ security staff

**Interview Script**:

1. *What are your doing for around here?*
2. *Is it the first time you visit here?*
3. *How often do you come around?*
4. *What attract you or you expect for in this area?*

Provide with materials

5. *Would you interact with it came across?*
6. *What do you think of the idea? Positive and negative*
7. *Do you know there is a symphony museum nearby?*
8. *Would you visit it later after this?*

Figure 5.10 Materials for concept acceptability test

Figure 5.11 Concept accepability interview in the selected district

Interviewee No.3:
Family having an afternoon tea at Black Stone Apartment, with 11 y/o boy


Interviewee No.4:
Security guard of Shanghai Conservatory of Music on duty, 25 y/o

### 5.2.4 Result

**Promising commercial value**
The vice president of NetEase Cloud Music and the real estate practitioner saw potentials of this installation, which utilize synesthesia as a basic theoretical principle. If it can serve as a center of information dissemination, then it can choose to disseminate information that has both cultural and commercial value: for example, the release of new recordings by the Shanghai Symphony Orchestra can choose these terminals as a public area to broadcast propaganda, or visually adopt visual artworks by emerging independent artists to form a mobile multi-media exhibition. With this model, the profitability of the installation and the importance of the community as a center of culture and art can be achieved while satisfying the need to spread knowledge of symphonic music and enhance the humanistic charm of the community, thus bringing revenue to the Shanghai Symphony Museum.
**Richer level of game engagement**
According to the idea expressed by the museum curator and planners, professional performers may also be activity leaders during the interaction with this installation. Inspired by Ryo Yamazaki's getting involved NPCs (Non-player Characters) as activity coordinator in Mount Fuji Park in Arima, challenging events are suitable for professional or more experienced people to lead others to participate, so as to explore the fun in a thorough way, and leaders will be more engaged in the activity because of the sense of self-achievement.
**Therefore, the difficulty level of the main body of the interactive game is set to bring appropriate feedback and thus differentiate the motivation of participants at different levels**:
1) Primary play purpose, with instant, excitement, visual stimulation as feedback, satisfying with physiological needs;
2) Deep exploration purpose, when trigger complete work, promoting rewards as feedback, satisfying with social belongness and social respect needs;
3) Professional level display purpose, when trigger complete work, support and admiration of others as feedback, satisfying with self-actualization needs.

Figure 5.12 Instant feedback

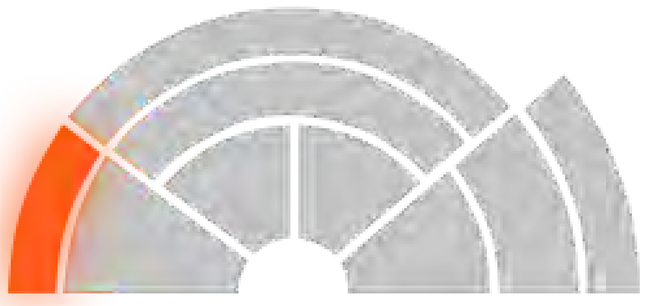



Figure 5.13 Promoting rewads

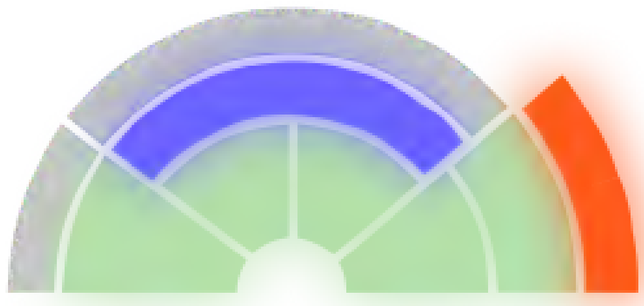
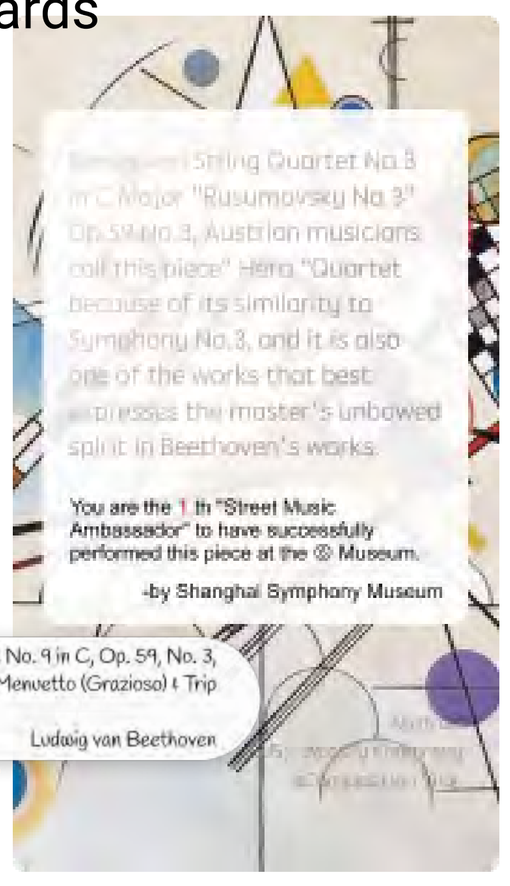


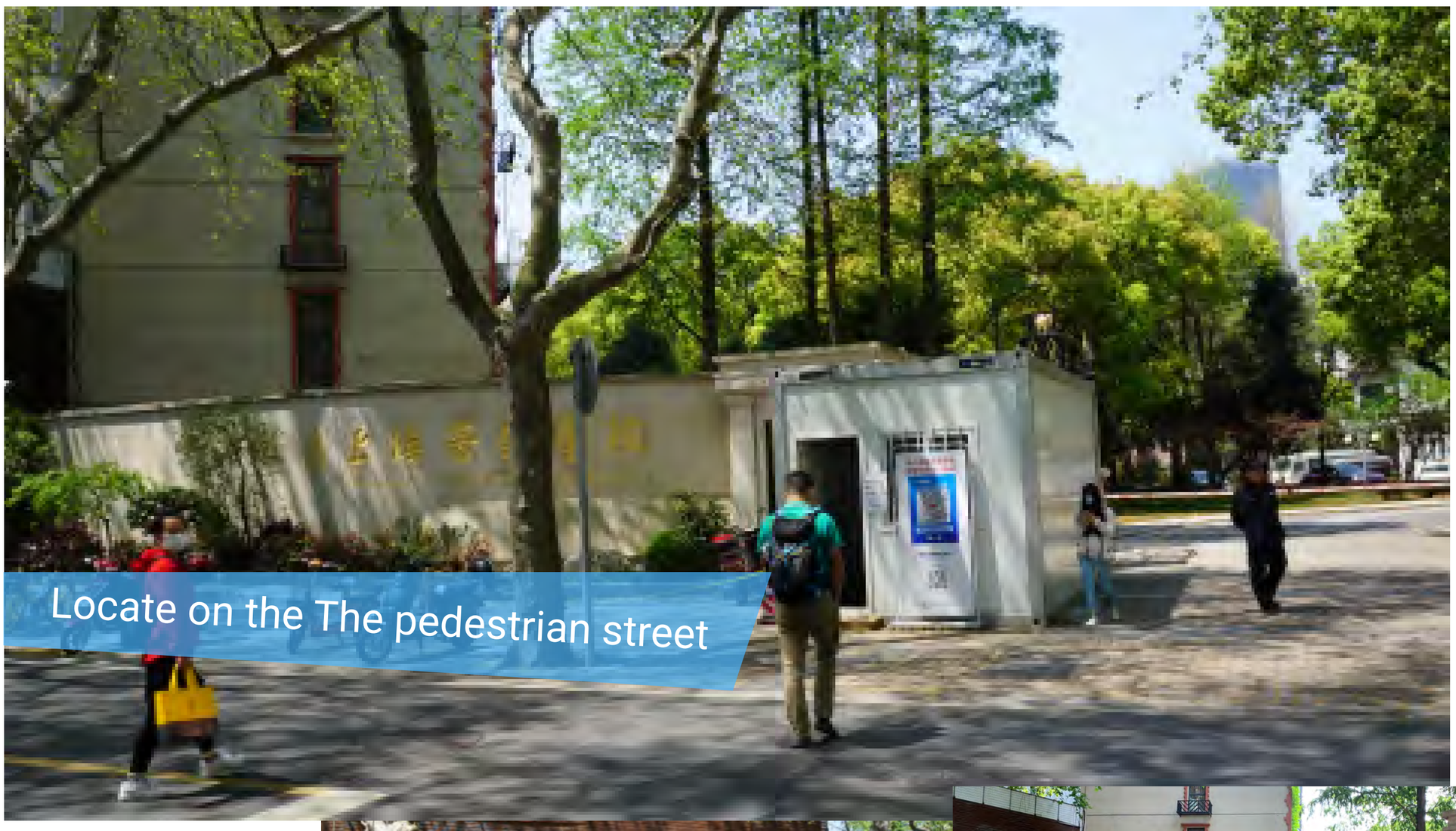

Figure 5.14 Accomplishment rewards



**Relocation**

The selected location was narrowed to the avenue in front of Shanghai Conservatory of Music, one block away from the Symphony Museum, due to the strong sense of preservation of the neighborhood's original atmosphere. The balance between technology and the human and natural environment in the historic district was also a challenge for the design. For the sake of protecting the surrounding community and matching the area most in line with the symphony's musical atmosphere as a priority for the pilot, mainly because the ambient sound here can be used as input information for the installation, to make better use of the environmental information and also to avoid breaking the quiet residential atmosphere of the non-musical background of the neighborhood.

Figure 5.15 Avenue in front of Shanghai Conservatory of Music





**Commercial environment:**
Musical instrument stores and cultural and creative shops are next to the gate


**Attractive sightseeing spot:**
Passengers always take photo in memory of the Mecca of Chinese Music.

**Terminal installation to be immersed with the surrouding**

The overall impression of the neighborhood is that it is a rare piece of Eden in the heart of a metropolitan with less digitalization and more humanism and close to nature, and they definitely do not want to break this atmosphere. Therefore, the installation was adjusted in appearance, eliminating the large-screen device and adopting a more integrated outdoor projection; with the ground device for interaction.

Figure 5.16 LCD as terminal interactive installation (1st edition, reference)


Figure 5.17 Interactive LED on-ground as input terminal (2nd edtion, reference)

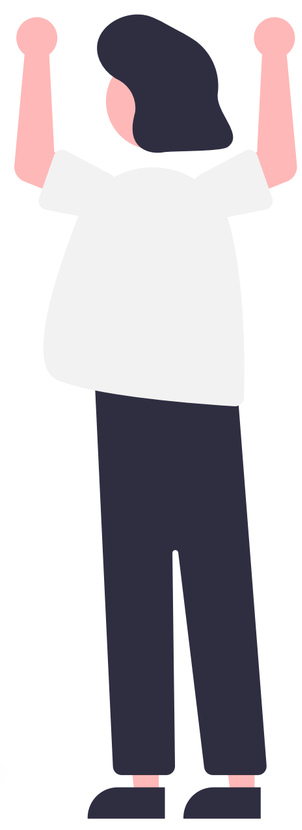
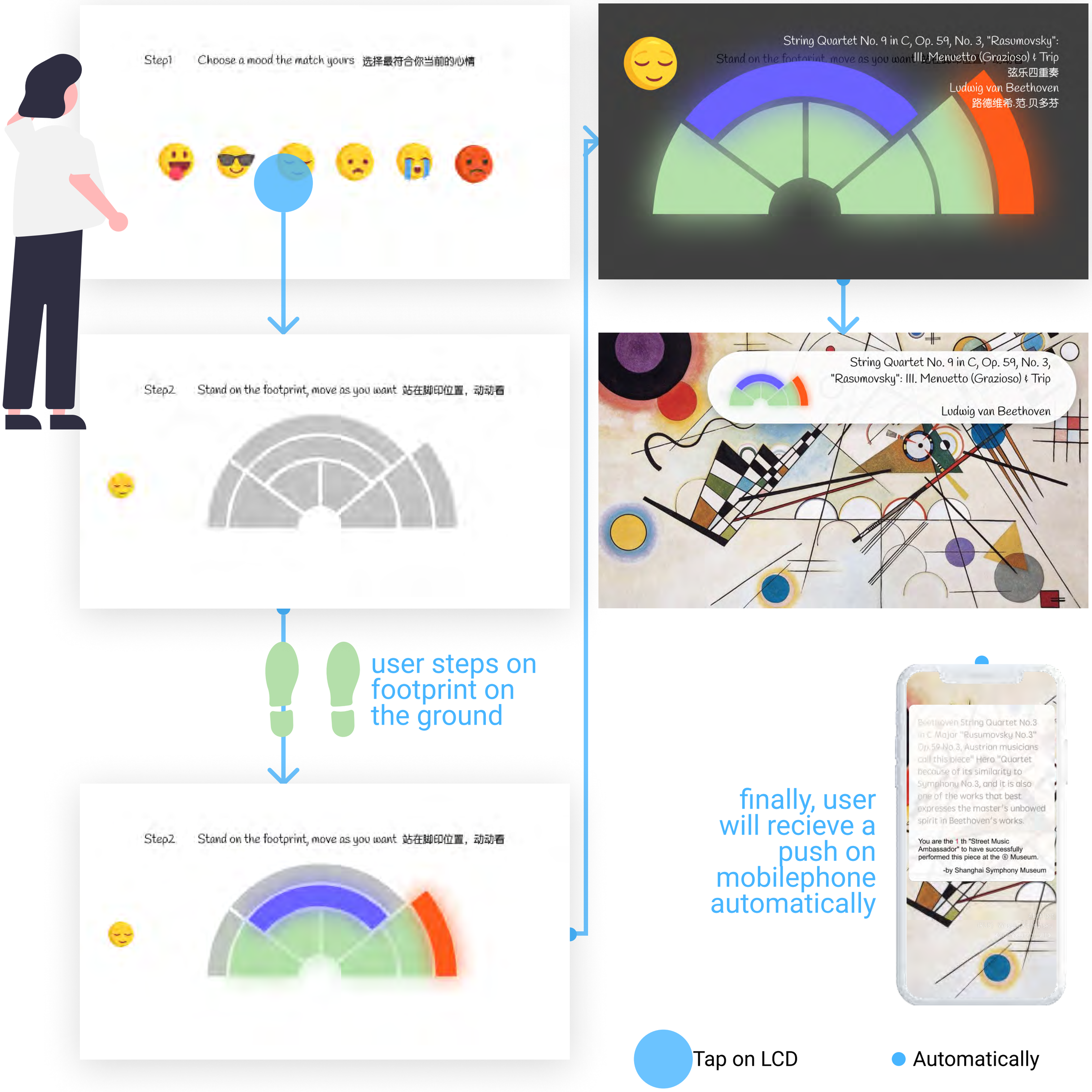


Figure 5.18 Ourtdoor projection as visual output terminal (2nd edition, reference)

Educational objective is the higher goal, while for the street device, having fun is the first step to get users involved. Interviewees were of diverse ages and backgrounds, including seniors, young people, children, professional performers, and security guards who had never been exposed to symphonic music. For these people, in a casual street scene, what catches the eye at once would be "seems with a lot fun and I would like to try". In order to enhance the playability of the product, the terminal display is more interactive, by setting a virtual figure to have "dialogue" with the passenger as navigation.

Figure 5.19 Worflow (1st edition)



Version 2- The target audience with a richer hierarchy of knowledge levels: professional performers - non-professional performers - the public, with the terminal interaction devices to be outdoor projection collaborating with ground interactive sensing devices.

Figure 5.20 Concept storyboard (Verson 2)

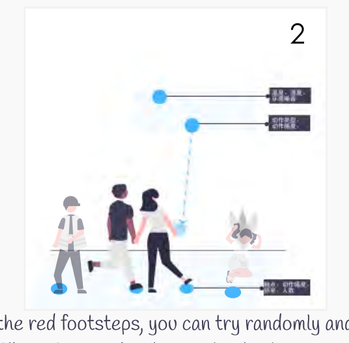
**Concept: Flow Museum of Sympony**

Breaking the limitations of physical space, music knowledge and joy is able to spread to the public and communities anytime through interactive spaces (sensors + display terminals), and public play a game of symphony to fulfill its promise of being the beginning of a new dialoguewith with others, with the environment, and with music. The symphony masterpiece and its basic components (tone/rhythm/intensity/instrument or timbre/emotional vibe) will be communicated in an open space as background music and vibe via multi-sensory installations to all, so that arouse public's initial love of symphony.

1

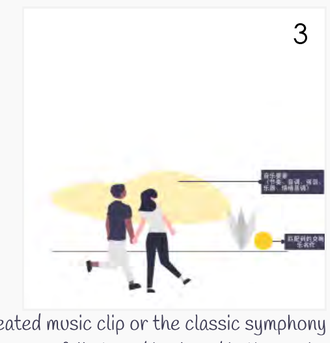
The public can move freely in an open space as usual, and the eye-catching "breathing wall" in the space attracts him and his colleagues to stop.

2



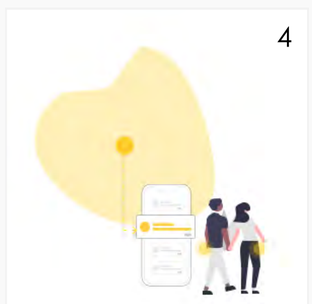
Standing on the red footsteps, you can try randomly and get a self music clip, until you tune a classic symphonies by cooperating with others or by yourself. As for which piece it is, the weather together with your mood, actions, and the number of people collabrating, will decide the one that fits the current situation best. Anyone who is interested can join you.

3



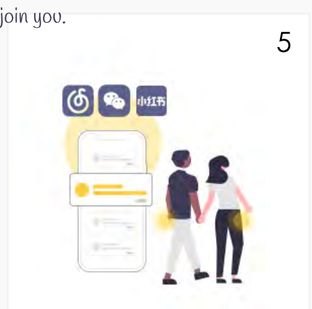
Your self-created music clip or the classic symphony that you and others have successfully tuned is played in the environment, and the breathing wall will change colors and beating rhythm to create a "symphony painting."

4



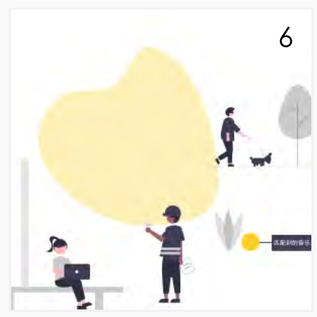
If you are nearby and bring along a mobile phone, you will receive your self-created music and an invitation card of Shanghai Symphony Music Museum. You can choose to collect this work in your Cloud Music account, or you can visit the museum with this invitation card at a specific time

5



Of course, you can share your creations with more people through social media.

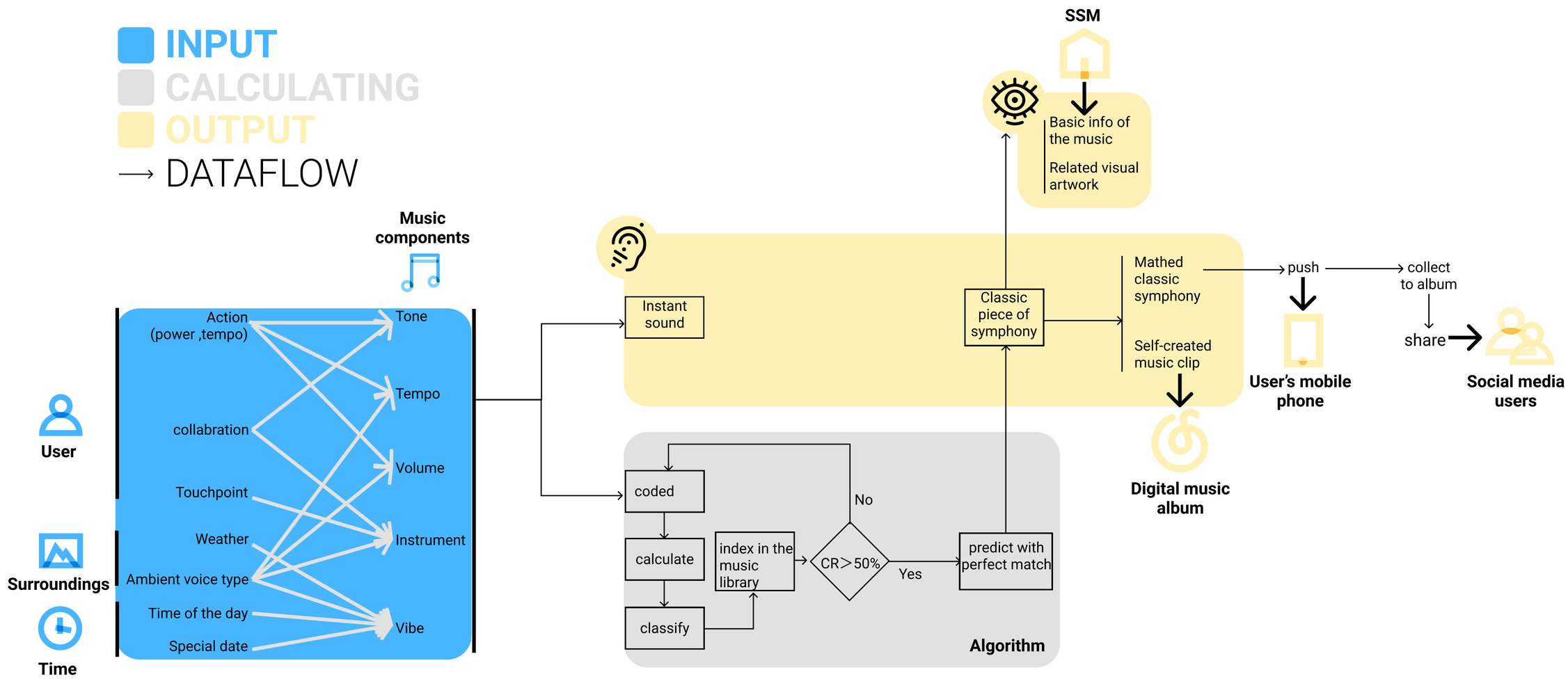
6



At this moment, you are the music ambassador in this space, and others who just want to spend a relaxing time here, will enjoy the music of your hard work and feel the happiness that music brings!

As the story scenario in the concept was determined, the first edition of the user experience journey and the frame of interaction was initially settled.

Figure 5.21 Frame of interaction (1st editon)



## 5.3 Develope and Implement

### 5.3.1 Sub-Hypothesis 3

Symphony seating chart as the basis of interaction rules helps users to build a relevant knowledge system, and the proficiency of users with different levels of symphony knowledge in symphony seating chart will be an effective basis to distinguish users' levels. Last but not the least, users will be interested in symphony when they have a stronger sense of participation and engaging experience with this type of music

### 5.3.2 Executive plan

**Step1** Develop mid-fi prototype;
**Step2** User test
**Step3** Iterate the prototype

### 5.3.3 Executive process

I utilized Protopie to build the middle fidelity prototype for user test. The Wizard of Oz test was done on the basis of this prototype. In the Figure 5.21 I present the component of the interfaces, which include three intotal: 1) User input interface, 2) the Wizard control interface, and 3) the User output interface

Figure 5.22 Protype interfaces

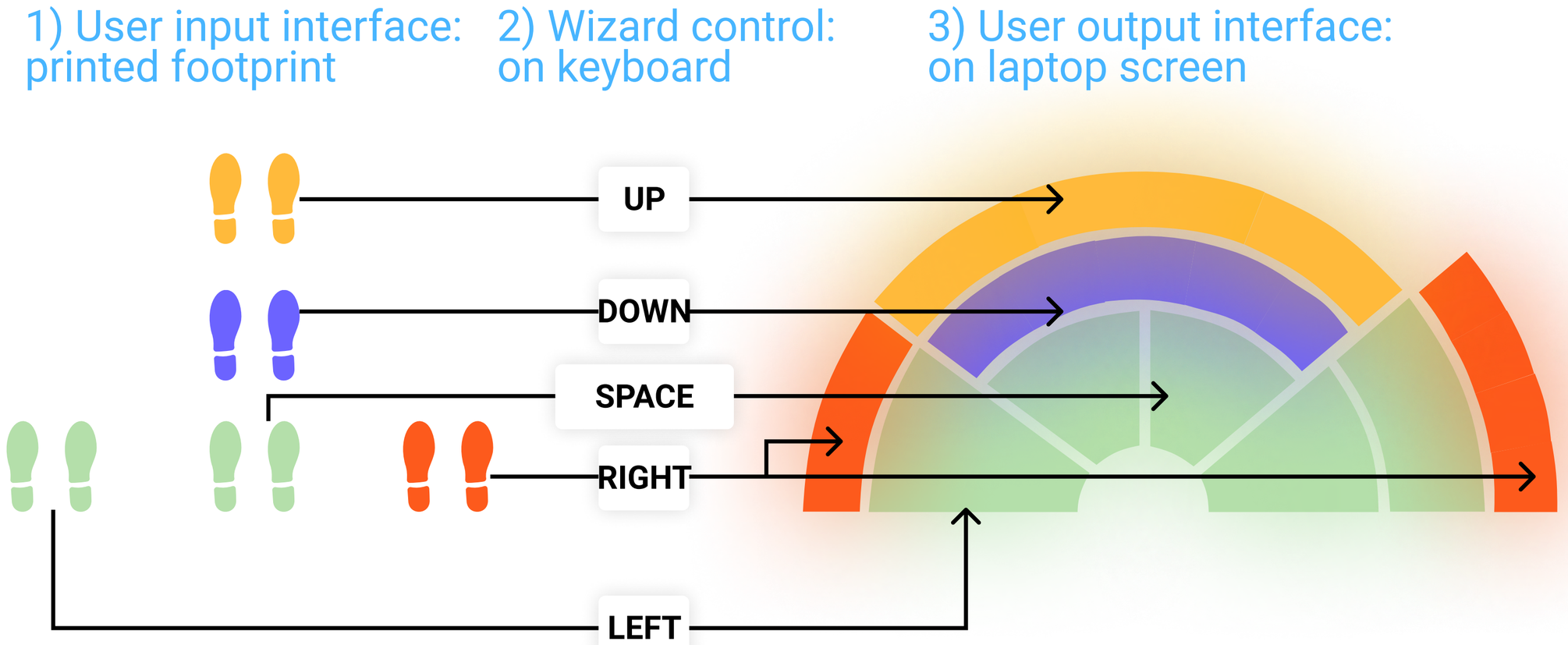



Figure 5.23 Protypes in Protopie

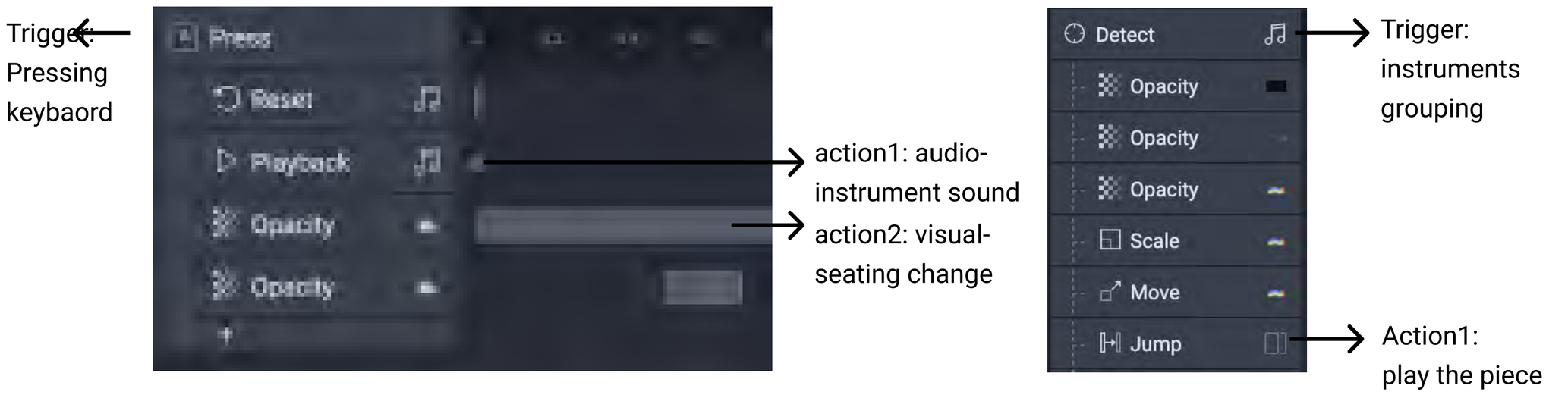
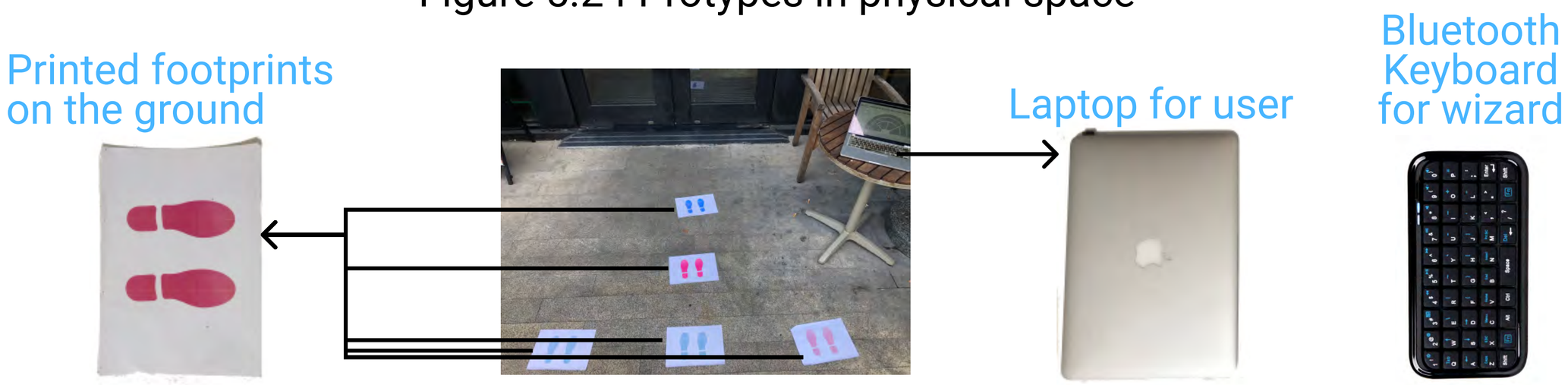



Figure 5.24 Protypes in physical space



**Tool: Wizard of oz user test**
Interviewees: 6 groups in total, Including 4 groups of individual test and 2 groups of couple test
Testing location: Café opposite to Shanghai Conservatory of Music
**Test materials**: Laptop to simulate projection and control protopie, printed footprints to simulate ground sensing, interfaces on Protopie

Figure 5.25 Materials for Wizard of oz test

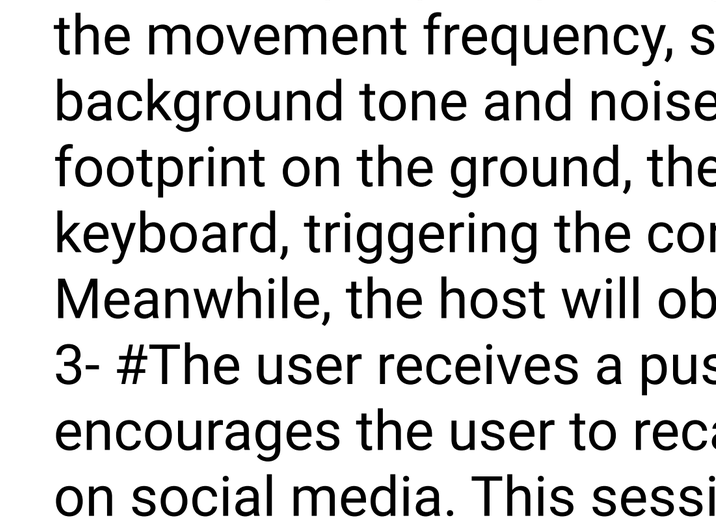
Footprints

Bluetooth Keyboard

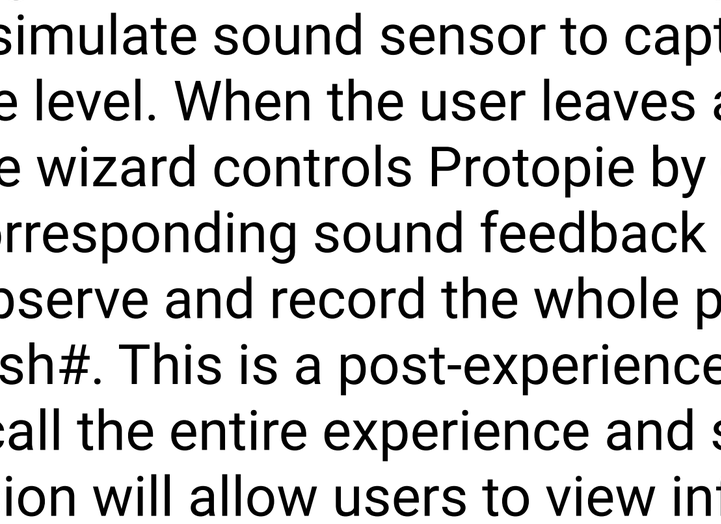
Laptop

**Test procedure:**
1- #Informing the user about the mission scenario# .“There is an interactive game on the street, with which you can start experiencing randomly”.
2- #The user is free to explore#. wizard will simulate intelligent algorithm to capture the weather condition of the day, simulate pressure sensor to capture the number of people operating at the same time, simulate pressure sensor to capture the movement frequency, simulate sound sensor to capture the ambient background tone and noise level. When the user leaves an action on the printed footprint on the ground, the wizard controls Protopie by operating the computer keyboard, triggering the corresponding sound feedback and visual kinetic effects. Meanwhile, the host will observe and record the whole process.
3- #The user receives a push#. This is a post-experience as a reward session that encourages the user to recall the entire experience and spread the flow museum on social media. This session will allow users to view information about the symphonic works and related visual artwork on the mobile App. The wizard will send a push to nearby users' phones with the help of Protopie simulating beacons. Meanwhile, the host will observe and record the whole process.
4- End of trial, the host will interview with users.

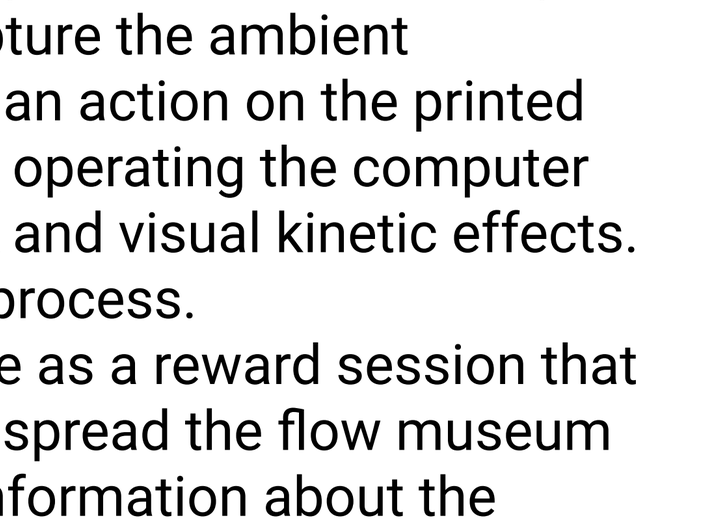
Figure 5.26 User in the testing procedure of Wizard of oz test



Exploring on himself




Accompany joining in

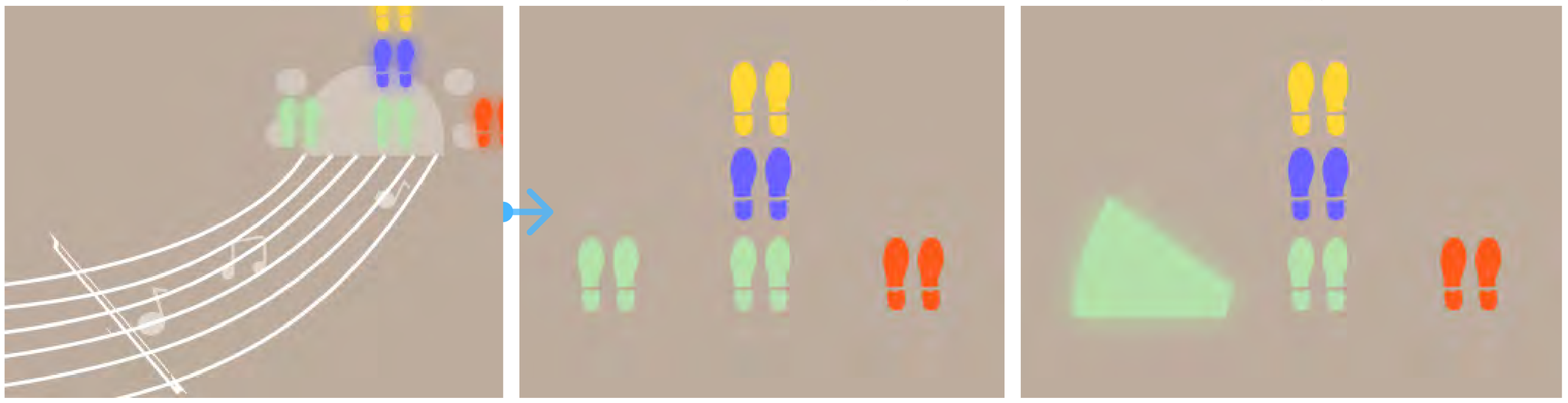



Received a push after successfully triggering a symphony work

### 5.3.4 Result

**Strenthen the Onboarding and Signifier of the system**
Disfluency when interacting is a common issue that occurred among the majority of the users.
Four out of three groups out of six of users got stuck in the first step and didn't know how to start an interaction, and five groups of users are confused about the relationship between their action and the masterpiece of symphony that has been triggered. Obviously, there needs to be a stronger indicational clue guiding the user from sightseeting in the community surroundings to the installations, while it should not be out of step with the surroundings. Besides, when they are interacting and playing randomly, a more related signifier should be attached onto the input, so that the user could has an anticipation of theri action feedback, however it is supposed to be differenciated with the percentage of exact feedback according to the familarity of the symphony knowledge, which are the seating of the orchestra arrangement and the mode of specific piece of symphony.
Optimization are as following:
1) for onboarding guidance, I utilize wayfinding signage on the groud to strengthen the moderate difference between the interactable area and the surrounding environment, and also strengthens Fool-proofing design to avoid unintentional passerby accidentally touching while walking in public space;
2) for signifier of symphony knowledge, I converge the input footprint and output seating feedback, which are both visual elements, onto one terminal to exhibit. In this way, the users could get direct instant feedback without transforming from one terminal to another. On the other hand, the technical elements including number of LEDs, material for LED cover on the ground, electronic infrastructure will need to adjust in the real product in the future.

Figure 5.27 Workflow of Onboarding (2nd edition, simulating)



**Onboarding:**
The signage on the ground as a hint

Leading passengers toward the interactive hotzone

**Signifier:**
An interactive footprint is standed on, it will turn into the corresponding instrument group on the seating

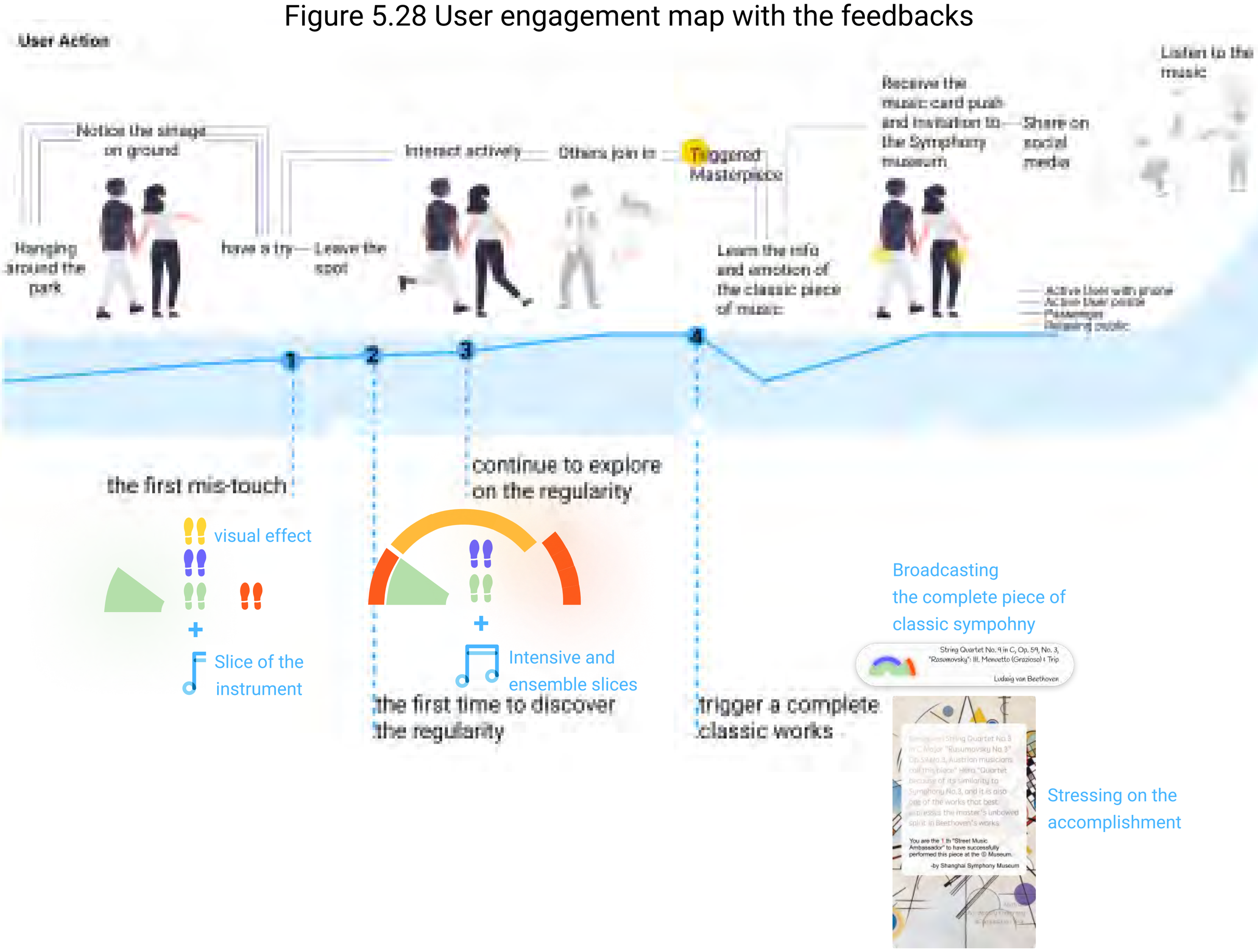
- Automatically

**Positive impact on music interest.**
All users marveled at the connection between the action and the wonderful music triggered by their own music, which we define as serendipity. They are excited and wanting to know the reason for it, while this experience drives users to continue exploring. For this reason, stronger gamification features and richer feedback hierarchy are needed, which means to provide positive feedback at several suitable plots in time. These plots are:

1) the first mis-touch;
2) the first time to discover the regularity;
3) continue to explore on the regularity
4) trigger a complete classic works

Corresponding to the user involvement deepened, the degree of sense of achievement raised up. It is necessary to continue to explore the differences in regularity of feedback types that mathes different context.

Figure 5.28 User engagement map with the feedbacks



**Limitted impact on music interpretation.**
First of all, not all of the users will reach the need and level to interpretating a piece of symphony.
Only those with appreciation ability and professional background will pay attention to the understanding of music content, and visual stimulation under the synaesthesia will be effective. The differentiated capability and comprehension in users' music appreciation depends on their ability and professional background. On the contrary, users who have never paid attention to classical or symphonic music (three out of eight users interviewed) would hardly notice the implications of both the acoustic and visual content at the same time, and it is because they were more immersed in the process of the game, which was learned in the after-test interviews.
What is worth noticing is that, for the users who were able to pay attention to the music content proactively, they had their own interpretation of the symphony work, so the more figurative the presentation of visual content was, the more likely it was to bring ambiguity. For example, in the selection of the interpretation version of the 3rd work Suite bergamasque, L.75 - 3. Clair de lune, the weather (cloudy), time of day (evening), rhythm of movement (soothing), and choice of mood (melancholy) were integrated, and Pascal Roge's piano edition was finally selected. The selection of visual artwork to match is A Seascape, Shipping by Moonlight by Monet. However, the current recording edition of the symphony masterpiece and the editions by Claudio Arrau or Lang Lang, convey completely different interpretations by the performers, and the listeners will have a thousand more ways of interpreting the work as well. Taking one elderly interviewee as an example, he saw Suite bergamasque, L.75 - 3. Clair de lune as a soundtrack to his morning routine, more of a leisurely experience.
Considering this situation, solutions are as following:
**first of all**, I recommend to reuse the methodology for the basic material selection according to the current practice of Shanghai Symphony Museums, which is the material library and selection work will all be discussed and decided by expert seminars;
**Secondly**, I will extract more abstract visual information in the visual presentation, only to bring up the artistic atmosphere, not to convey tendentious views;
**Lastly**, when designing feedback after music retrieval activities, I will always take the promoting most of user starting to put interest in symphony as main objective, and all the interactive solutions is designed to serve that. Using neutral information such as the participation rate and social media encouragement and so on, instead of putting too much subjective interpretation into this activity.

Figure 5.29 A reference for abstraction of vistual artwork

I SEE YOU by Mianhua

Abstracted visual element

## 5.4 Final Solution

### 5.4.1 Business level

**Valute Proposition of Flow Museum of Symphony**

Music Mecca ⟵ ⟶ Symphony Ambessador

It is the heart of urban music culture backed by a historical and cultural district. The public can easily interact with each other or professional performers through games in the open space, so as to intuitively learn, appreciate and perform classic symphonic music. In this space, music is the language, breaking the barriers of class and identity, and everyone is a symphonic music cultural ambassador.

**Visitor Segments**


**Stakeholders of Flow Museum of Symphony**

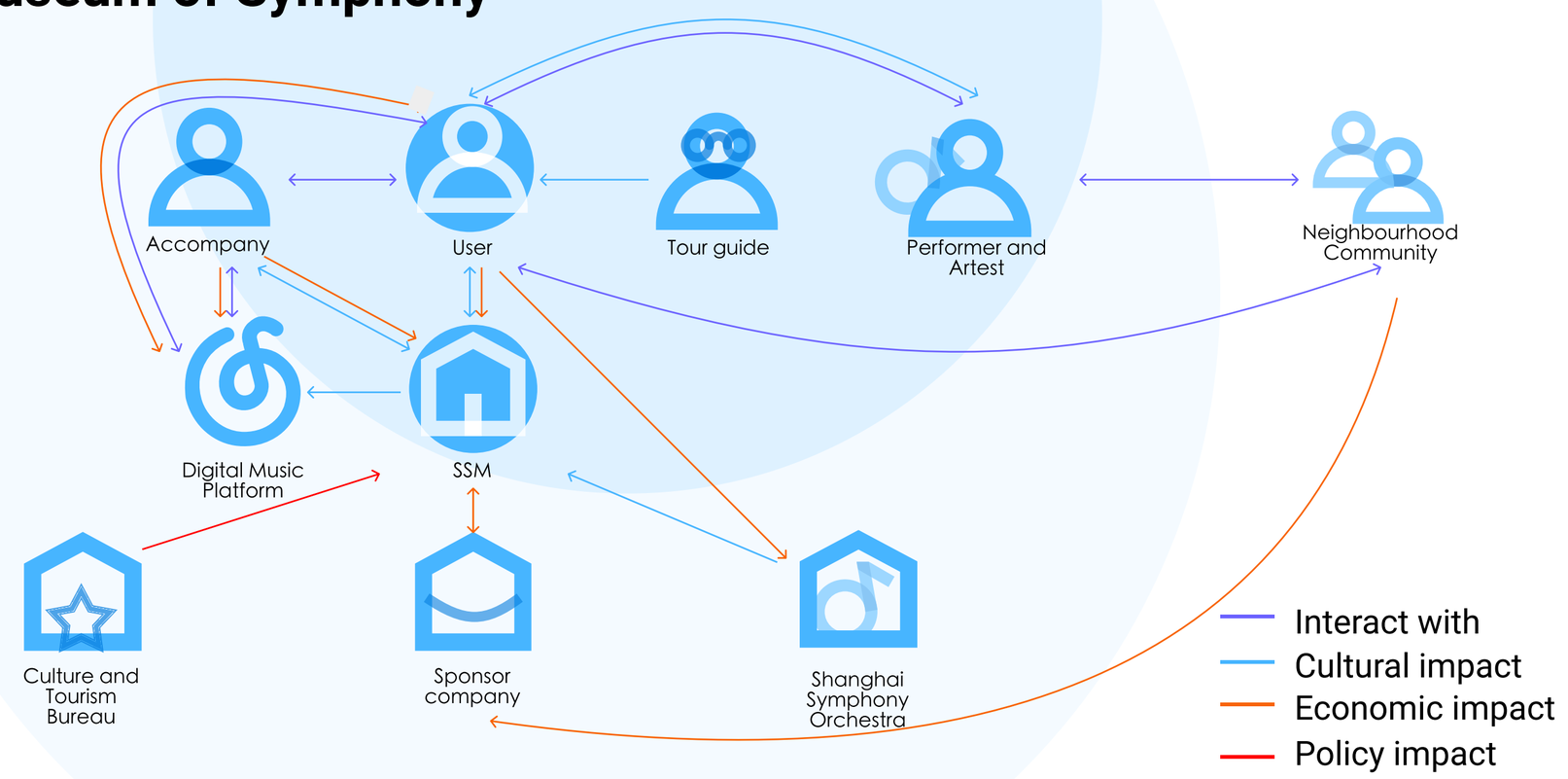
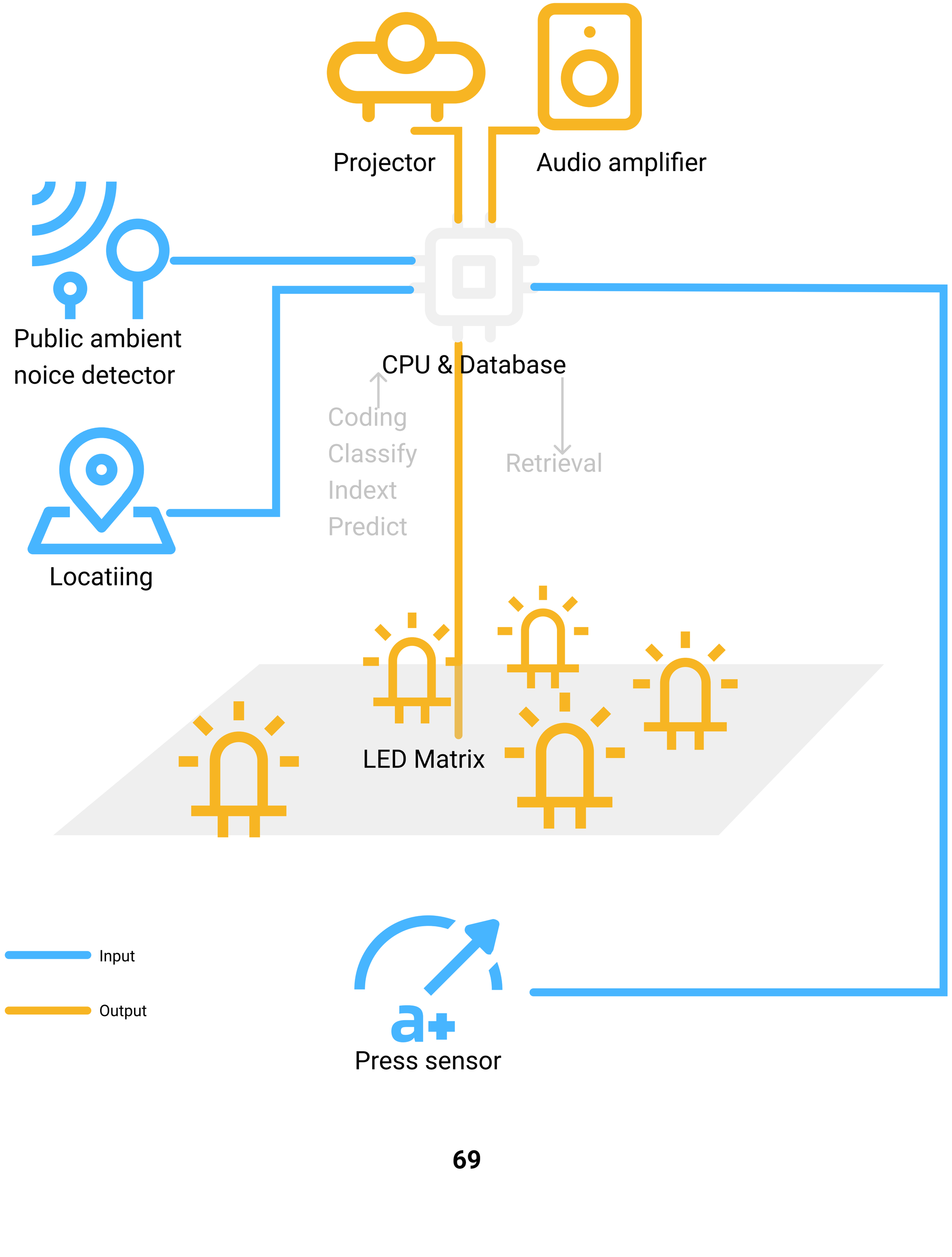



Figure 5.30
Stakeholder map

## 5.4.2 Feasibility level

### Technical mechanism and space installating

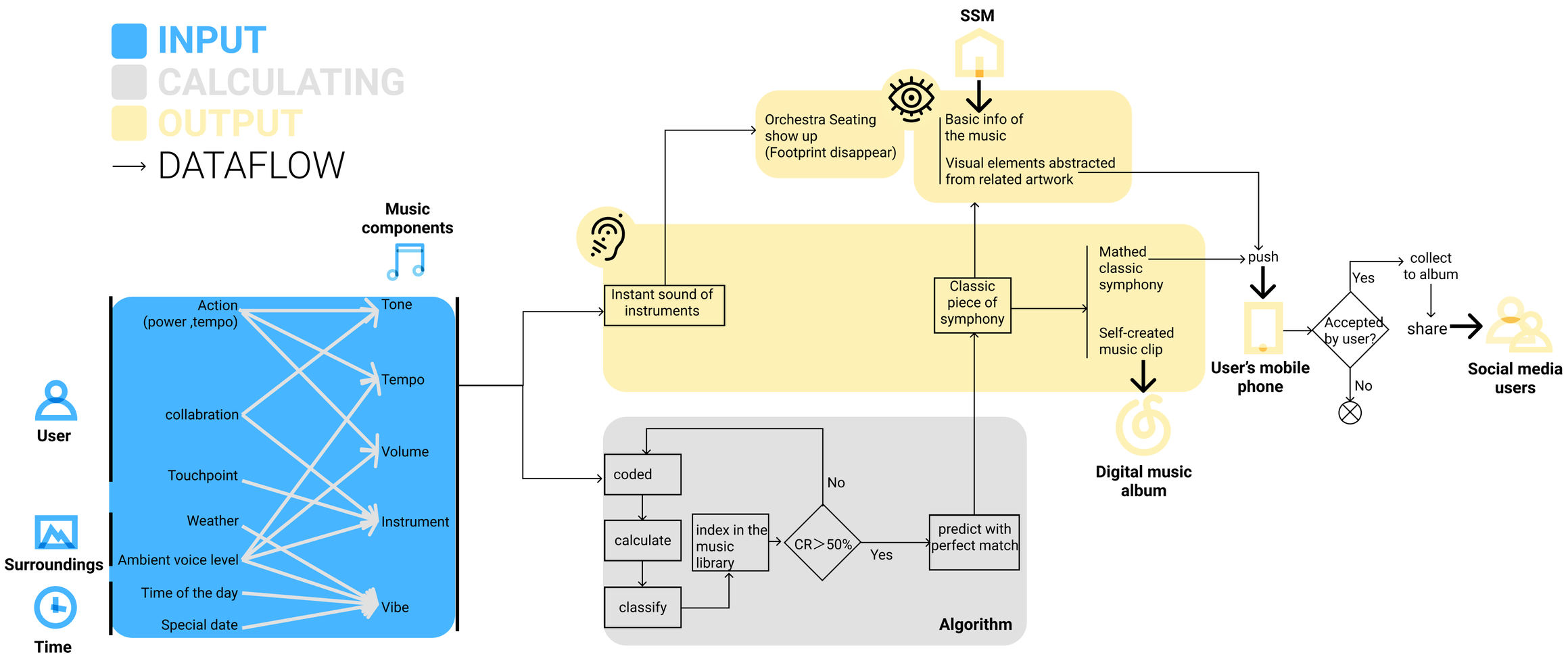
Figure 5.31 Technical components and mechanism



## 5.4.2 Experience level

### Frame of interaction

Figure 5.32 Frame of interaction (2nd editon)



# 6. Conclusion

## Flow Museum of Symphony

When museums come out of the halls and into the community, and the public can participate with friendly strangers they come across or with their own friends or families, "entering a museum" is no longer an activity for which they need to be fully psychologically and intellectually prepared. They are willing and able to interact with museums anytime, anywhere because of the low barriers to participation and the accessibility of the community.

The Flow Museum of Symphony, which combines digital interactive installations and technology, allows the public to approach symphony more easily than ever before and to begin to play with, accept, and eventually enjoy it. The museum has changed its form to a playful and enjoyable environment with a musical atmosphere where people can begin to experiment because it is "fun". This form of museum can effectively lower the threshold of public participation and understanding of the symphony. Serendipity brings surprises, which is an additional gain of education and fun for the participating public. In order to better help users build a knowledge system, the difficulty of the game rules should not be too high. The orchestra seating chart used in this thesis establishes a more intuitive visual association with user behavior before it is effective for users to grasp it quickly. Otherwise, the random component may dominate because the association is not obvious enough and the difficulty of understanding increases, leading to users giving up exploring the logic behind the game.

During the interaction process, rewards at the physiological level, social level, and self-actualization level need to be provided at key plots. The plots are: 1) the first occasion touch, 2) first discovery of a pattern, 3) continuous exploration on regularity, 4) triggering a complete classic work. This approach guarantees that the willingness of the public with diverse levels of knowledge can be effectively stimulated during the activity, so that they can take the initiative to explore and interact more, and even perform a recommendation and spread behaviors. However, the visual information as a synaesthesia assistance is not effective for all of the public to reach a higher level of music comprehension. It can enhance the understanding of symphonic music for a portion of the public who are willing to learn about symphonic music or have a basic symphonic sensibility, but it does not positively promote the more specialized symphonic audience or the public who have no basic symphonic music at all. How to better help a broader public understand and appreciate the arts is the issue that needs to be further explored in future research.

# 7. Further Discussions

## 7.1 Further studies to go

For this study, the unfinished part is to test the real reflection of users on the street with a high-fidelity prototype to see if the current solution can really catch their attention in the random across, and if onboarding is effective for a passenger to start the game completely unguided in a real scene.

Digital museums that enter the community are just one attempt for sound-based museums to have a better visiting experience, and Shanghai's Heng-Fu Historic District has the advantage of hosting such flow museums in the local community. Other museums of similar type, such as the National Museum of African American Music, have begun to reach out of the museum into the U.S. school education online system and have created digital spaces to disseminate knowledge about music

Figure 7.1 Quaver Ed
(the Official activity online of National Museum of African American Music)



But more research is needed to be performed on how to communicate values with a broader public even in the local community where music activities has never occurred, and whether flow museums replicated in more sound-based museums can still be applicable.

## 7.2 Potential risks

**The issue of copyright composition** for public space music broadcasting requires cooperation with organizations that have the right to public broadcast of the work. The copyright consists of Composing copyright, Right to broadcast in public space, and Right to distribute the performance version.

**The protection of the community's native environment** during the promotion of this solution will be an issue that may bring resistance. Customization needs to be done in the process of community-based design of the museum for the characteristics of the local community. The potential risks will include: Transitional digitization, Noise pollution, Conflict between visibility and peaceful charm of the community.

**Authority and responsibility of subsequent operating**, including conservation, profit and loss responsibility attribution issues, will need to be discussed in consultation with relevant government branches. Topics will include: Land occupation, Public space utilizing and conserving and so on .

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